



DOCKET NUMBER
PROPOSED RULE PR-50
(49 FR 27769)

DOCKET
USNRC

153

Nuclear Information and Resource Service

1616 P Street, N.W., Suite 160, Washington, D.C. 20036 (202) 328-0002

September 26, 1985

Nunzio Palladino, Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: Proposed Rule to Convert Research Reactors from Bomb-Grade Uranium (49 Federal Register 27769)

Dear Chairman Palladino:

The Nuclear Information and Resource Service (NIRS) is a national organization which, among other functions, helps keep the public informed about NRC activities. We usually assume that the Commissioners are not in need of our services because the NRC Staff is able to keep the Commissioners fully informed.

In the case of the Commission's proposed HEU conversion rule, however, it appears that the NRC Staff's extraordinary hostility to the proposed rule has so colored their actions that they have declined to carry out the Commissioners' directives.

As you are aware, in February and again in June, 1984, you and your fellow Commissioners unanimously overruled the Staff and directed them to prepare and publish for comment a rule to convert research reactors to non-bomb-grade uranium. The Staff was told to put aside its opposition to the rule, publish it and analyze the public comments that were received.

Although a large number of comments were received, and although the vast majority strongly favored the rule, the Staff declined to analyze most of the favorable comments. In their June 1985 paper to the Commissioners, in which this analysis was to have been reported, the Staff merely indicated that, because it was going to recommend against the rule, it was choosing not to analyze most aspects of the favorable comments. (SECY-85-213, Encl. B, at 3)

Because of the Staff's failure to provide you with those public comments which favored the rule we have taken the opportunity. You will find these attached.

It appears that, despite clear directives from the Commissioners to come back with the rule as originally written -- with the possible exception of a generic licensing provision -- that the Staff has returned a wholly inadequate proposal. This proposal does not contain the generic licensing provision and instead is

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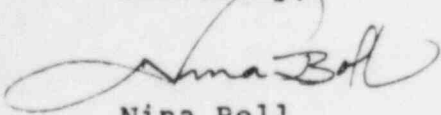
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Add: William R. Laks 113055

so loaded down with revisions, alterations, and new provisions that the entire purpose of the original rule has been jeopardized. We understand that the Staff isn't even giving the Commissioners the option of voting for the rule you previously have three times approved, but only to vote for or against the eviscerated version.

We urge you to approve the original rule you already endorsed, rather than abandon the resolution of the HEU issue as the new Staff proposal would do. Moreover, in view of the Staff's consistent opposition to the intent of the rule, we urge you to consider making the following modifications: 1) Establishing a fixed schedule for completion of conversion, e.g. three years from effective date of the rule or qualification of appropriate LEU fuel; and 2) Providing that a request for exemption be approved by the Commissioners.

Sincerely,

A handwritten signature in cursive script, appearing to read "Nina Bell".

Nina Bell
Assistant Director

Encl: Public comments in favor of original HEU rule
cc w/o enclosure: Reps. Udall and Markey
Senator Hatfield

DOCKETED NUMBER

PROPOSED RULE

PR-50 (45)

DOCKETED

CA9FR 27769

6400 Georgetown Pike
McLean, Virginia 22101

'84 SEP 12 P2:06

'84 SEP 24 P2:58

September 8, 1984

Secretary of The Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SECRET
DOCKETING & SERV
BRANCH

Dear Sir:

I understand that the Nuclear Regulatory Commission is considering a proposed Regulation that would require the conversion of all U.S. research reactors from the use of highly enriched Uranium (HEU) to non-weapons grade material. I strongly support this proposed regulation and urge its issuance.

I am enclosing a Declaration that I made to the Atomic Safety and Licensing Board in 1982 in the case of the University of California at Los Angeles reactor. In addition to the brief description of my professional qualifications appended to the enclosed Declaration, I was a Member of the USAEC Committee on Nuclear Safeguards from 1970 to 1972.

I still support the position stated in that Declaration. The United States must set the standards and abide by them itself if it is to persuade other nations to forego the unnecessary use of HEU, which can be used directly in nuclear weapons. Today with the increased dangers of nuclear terrorism, every possible step must be taken to reduce the risks that weapons grade materials will fall into irresponsible hands.

I would appreciate it if my views were taken into consideration as the Commission addresses the proposed regulation.

Sincerely yours,

Herb Scoville, Jr.
Herbert Scoville, Jr.

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add-William R. Laks
113055 1/1

Acknowledged by card...

9/13/84

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

THE REGENTS OF THE UNIVERSITY
OF CALIFORNIA

(UCLA Research Reactor)

Docket No. 50-142 OL

(Proposed Renewal of
Facility License)

DECLARATION OF DR. HERBERT SCOVILLE

I, Herbert Scoville, declare as follows:

1. I am presently President of the Arms Control Association. Prior to that time I was Assistant Director of the U.S. Arms Control and Disarmament Agency; before that I was Deputy Director of the Central Intelligence Agency for research. From 1948 to 1955 I was employed by the Armed Forces Special Weapons Project (now the Defense Nuclear Agency) of the Defense Department, studying nuclear weapons effects. A more detailed description of my professional qualifications is attached.
2. It is my understanding that UCLA has requested from the NRC a license for up to 4999 grams of Uranium-235 at 93% enrichment, recently amended from a request for 9400 grams.
3. It is my professional opinion that, absent extremely compelling reasons to the contrary, the facility should instead employ low-enriched fuel, i.e. special nuclear material that cannot be used directly in nuclear weapons. My reasons are as follows.
4. 93% enriched uranium is weapons-grade. In other words, it can be used directly in nuclear weapons without further enrichment. As such, it is extremely sensitive material which needs to be carefully safeguarded. More particularly, it should only be used where absolutely necessary.

5. The move to cut down the amount of HEU at the research reactor at UCLA can have very salutary international effects as well as ones locally. It is important from a U.S. policy standpoint to make as difficult as possible the acquisition of material such as HEU that can be easily fabricated into a bomb.

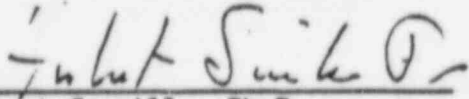
6. However, we cannot hope to have one standard in the U.S. for availability of HEU and for safeguards on its use and a different standard for other countries. The precedent set at UCLA will be useful in dealing with other countries such as India or Brazil as they seek HEU for their research reactors.

7. A recent example of this problem arose in Iraq. The French were supplying Iraq with a research reactor using HEU. We tried to persuade the French to provide only lower enriched material but the Iraqi government refused to accept this. When the HEU became available in Baghdad the Israelis felt it necessary to carry out a preemptive bombing raid to destroy this reactor. While I think such a violent reaction was very ill-advised, it nevertheless demonstrates the dangers of having large amounts of HEU available in locations where it might be seized and converted to a weapons program. It is perhaps more likely that a nuclear war will start with a bomb being used by a small country or terrorist organization in the Middle East than that the Soviet Union and the United States will start a nuclear war with their thousands of warheads. Therefore the control of HEU is very important, and the standards set in the UCLA case should be useful in dealing with such a problem in the future.

8. For many research reactors it is no longer necessary to have HEU with 93% enrichment; 20% may be quite satisfactory, and this cannot be used for weapons. Therefore, a second step at UCLA, in which the reactor would be converted to use only 20% material, would be very important. It is hoped that having taken the first step of reducing its inventory of 93% material, it will now move on to this conversion to 20% enriched fuel.

I, Herbert Scoville, swear under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed on October 17, 1982,
at Los Angeles, California


Herbert Scoville, Ph.D.

PROFESSIONAL QUALIFICATIONS OF DR. HERBERT SCOVILLE

I am presently President of the Arms Control Association, which I co-founded in 1970.

From 1963-1969 I was Assistant Director of the United States Arms Control and Disarmament Agency. Prior to that I was Deputy Director for Research (Science and Technology) of the Central Intelligence Agency.

From 1948 to 1955 I was Technical Director of the Armed Forces Special Weapons Project (now the Defense Nuclear Agency) of the Defense Department, studying nuclear weapons effects.

From 1946 to 1948 I was Senior Scientist at Los Alamos, studying weapons effects for the Atomic Energy Commission.

I received my B.S. from Yale in 1937 and my Ph.D. in physical chemistry from the University of Rochester in 1942.

DOCKET NUMBER PR-50
PROPOSED RULE (41FR 27769)

(88)

DOCKETED
USNRC

MEMO

RECORDED

'84 OCT 25 A10:38

October 22, 1984

'84 NOV -6 A11:20

From: Richard D. Rogge
32010 Watergate Court
Westlake Village, CA 91361

To: Docketing & Service Branch
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Enclosed for your consideration please find my
Statement regarding the use of weapons-grade
uranium fuel in domestic research reactors.

8410290082 841022
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Acknowledged by card

10/25/84
pk

October 11, 1984

Statement of Richard D. Rogge

Before the
Subcommittee on Energy Development and Applications
and the
Subcommittee on Energy Research and Production
Committee on Science and Technology
U.S. House of Representatives

Regarding
The Use of Weapons-Grade Uranium Fuel
in Domestic Research Reactors

My name is Richard D. Rogge. I am currently a security consultant. For thirty years previous, until my retirement in 1977, I was with the Federal Bureau of Investigation, during the last years as Special-Agent-in-Charge of a number of FBI field offices. In that capacity I had responsibility for assessment of and protection against potential terrorist activities in this country as well as numerous physical security duties involving the security of FBI field offices. A statement of professional qualifications is attached.

In the last two years I have been involved in some security consulting with regard to assessing the adequacy of security at a research reactor in Los Angeles which utilized what I understand to be highly enriched (i.e., weapons-grade) uranium. I reviewed the security situation at this reactor facility, which is located on an open

Statement of Richard D. Rogge/page two

university campus (UCLA).

I concluded that a terrorist intent on stealing the uranium from this facility would have a field day, given the woefully inadequate security posture I found. Little security attention had been paid at the facility despite the presence of weapons-grade materials on site. It was in fact one of the most undefended targets I have seen in my several decades in the security field. The perimeter was essentially indefensible, doors and locks were of ordinary construction, hinges were on the outside, there were no guards in evidence, and students and others were wandering freely and without challenge nearby.

Correction of the security problems at the facility would have required major changes, which would have been expensive and difficult, given the university setting. In fact, in part because of my recommendation, California Assemblyman Gray Davis called for and received substantial upgrading of security at the site for the few weeks of the Olympic Games, portions of which were held a few hundred feet away. This was expensive and only occurred after substantial pressure was applied. One wonders what the security situation is at other research reactors in this country which do not have the presence of the Olympics to resolve even temporarily some of the security deficiencies.

It is my impression that if the security at other

Statement of Richard D. Rogge/page three

research reactors around the country utilizing weapons-grade uranium is as grossly inadequate as was the a parent case at UCLA, then a serious security problem exists. There is always the possibility of a nuclear threat in this country, and we should either protect these facilities adequately, or take steps to minimize the threat.

It is for this reason that I support the proposed rule by the Nuclear Regulatory Commission to require research reactors with weapons-grade uranium to convert to low enriched, non-weapons-grade fuels which, if stolen, could not be used to make an atomic bomb. The security risks associated with a successful theft of such bomb material-- which would be relatively easy if the security at other facilities is anything like what I observed at UCLA-- appear very large.

The only other choice would be dramatically increased security at facilities that continue to possess highly enriched material. This would be very expensive to the institutions involved, not as effective as removing the risk by converting to low enriched fuels, and would likely conflict with the open environment of university campuses.

Recent events in Beirut remind one that we live in a world of terrorists, and that protective measures must be taken in a timely manner or tragedy can result. The consequences of terrorists acquiring nuclear weapons material must give pause to all persons concerned with

Statement of Richard D. Rogge/page four

this nation's security. It therefore seems most prudent to move expeditiously to remove the risk at these reactors by replacing weapons grade uranium with material which, if stolen by a terrorist group, could not be used to make an atomic bomb.

Thank you for your consideration of my remarks.

Richard D. Rogge
Dick Rogge and Associates Investigations
32010 Watergate Court
Westlake Village, CA 91361
(818) 707-1836

RICHARD D. ROGGE
Professional Qualifications

My name is Richard D. Rogge. I am presently, President of Dick Rogge and Associates Investigations, a professional security firm. For thirty years previous I was with the Federal Bureau of Investigation.

I entered on duty with the FBI in 1947. In 1952 I was appointed by the late J. Edgar Hoover as a Special Agent and, following a period of training at Quantico, Virginia, was assigned to the Philadelphia, Pennsylvania field office. From 1954 to 1958 I served in the Washington, D.C. field office, in 1958 being transferred to FBI Headquarters in a supervisory capacity.

In 1965 Mr. Hoover designated me Assistant Special Agent in Charge of the Richmond, Virginia field office. Subsequent promotions took me, in the same capacity, to two of the largest FBI offices, namely Philadelphia, Pennsylvania, in 1966, and Los Angeles, California, in 1967. In 1969 I was promoted to Inspector and reassigned to FBI Headquarters in Washington, D.C., where I acted as a personal representative of Director Hoover while inspecting FBI field offices. In late 1969 I became Special Agent in Charge of the Honolulu office, with subsequent promotions to Richmond, Virginia (1972), and to Buffalo, New York (1974), where I served as Special Agent in Charge until my retirement from the Bureau in 1977.

I am a member of the American Society for Industrial Security; the Association of Former Intelligence Officers; California Association of Licensed Investigators; National Association of Chiefs of Police; and the Society of Former Special Agents of the FBI, Inc.

ROGER L. KOHN
524 ELEVENTH STREET
MANHATTAN BEACH, CALIFORNIA 90266

PROPOSED RULE PR-58 (30)
(49 FR 27769)

August 28, 1984

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, DC 20555

RECEIVED

'84 SEP 14 P12:44

'84 SEP -4 P3:47

Attention: Docketing & Service Section

PUBLIC

Re: Proposed HEU Conversion Regulation (49 Fed. Reg. 27,769)

Dear Sir:

I understand that the NRC is considering a proposed regulation to require conversion of research reactors to low-enriched fuel. I support such conversion, and urge that it be mandatory, immediate, and with only the narrowest of exceptions.

I believe mandatory conversion is necessary because of the risk of theft of high-enriched weapons-grade uranium (HEU) from research reactors and because there are no sufficient counter-vailing benefits to offset the risk.

Contributing to the risk are at least three policies:
(1) University reactors, located as they often are in the university environment; cannot, consistent with the open-access policies of educational facilities, be protected as adequately as can other reactors; (2) It is my understanding that the NRC Staff's view of its practice is that only post-reporting of theft, but not prevention of theft, is required; and (3) the NRC staff has apparently been unwilling to appropriately calculate and enforce the 100 rem-per-hour exemption.

In addition to the unfortunate practice of not requiring protection against theft, I am concerned about the failure of the NRC Staff to date to appropriately calculate and enforce the 100 rem/hr exemption. The exemption's radiation level appears rather arbitrarily determined, and would permit theft of HEU with doses to individual members of a group of thieves not substantially larger than the doses permitted nuclear workers in exceptional circumstances. Even when the regulation is implemented, it is unreasonably interpreted by Staff to allow use of whole-core exposure, when the clearly separable fuel bundle would produce a seriously smaller dose not meeting the 100 rem/hr requirement. Thus the exemption is neither well-founded nor applied in accord with the very letter and spirit of the exemption's intent of preventing theft of fuel bundles. I have attached my declaration in this regard concerning the UCLA research reactor exemption deficiency.

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ACKNOWLEDGED

9/5/84

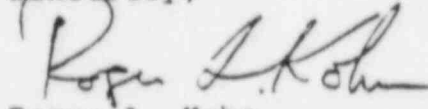
pd

Secretary of the Commission
U.S Nuclear Regulatory Commission
August 28, 1984
Page two

If universities cannot, consistent with budgetary constraints and open-access policies, protect against theft of the weapons-grade uranium that they possess, and since the country and the world surely cannot tolerate diversion of such fuel, then the clear, reasonable, and practicable solution is mandatory, immediate, and enforced conversion to low-enriched uranium.

Please consider my comments, and attached declaration, in your review of the proposed HEU conversion rule.

Sincerely,


Roger L. Kohn
Ph.D., Applied Physics
J.D., Attorney at Law

Enc.: Declaration of Roger L. Kohn regarding 100 rem/hour
exemption miscalculations

FCICBG

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)

THE REGENTS OF THE UNIVERSITY)
OF CALIFORNIA)

(UCLA Research Reactor))

Docket No. 50-142 OL

(Proposed Renewal of
Facility License)

DECLARATION OF ROGER L. KOHN in Support of Intervenor
Committee to Bridge the Gap's Brief on the Applicability
of Physical Security Regulations to this Licensing
Proceeding

I, Roger L. Kohn, declare as follows:

1. I am presently a third-year law student at UCLA School of Law, and expect to receive a J.D. degree in May 1983.
2. I am also a physicist and systems analyst. I received a B.A. degree with honors in physics from Haverford College in 1963, and M.S. and Ph.D. degrees from Stanford University in 1965 and 1968, respectively. I have completed coursework and employment in both experimental and theoretical nuclear physics, and have had twenty years experience in various applications of physics, mathematics, and computer programming. My professional resume, giving my credentials prior to law school, is attached.
3. I have read University's Response to Intervenor's First Set of Interrogatories on Contention XX, August 9, 1982, and Neill C. Ostrander's Fuel Self Protection Calculation dated August 25, 1982, attached to UCLA Representative William H. Cormier's response letter of August 26, 1982.
4. Assuming the values, assumptions, approximations, and equations used in the first two paragraphs of Exhibit "A" of University's Response to Intervenor's First Set of Interrogatories on Contention XX (hereinafter cited as Exhibit "A") or cited in Neill C. Ostrander's Fuel Self Protection Calculation dated 8/25/82, to be correct, I have constructed a calculator program which is capable of calculating dose rates for various times following shutdown. The program produces substantially the same dose rates at delay times of 1, 2, 3, and 4 weeks as those given in paragraph three of Exhibit "A".
5. The match is appreciably better if I assume that the delta-function energy pulse occurs at the end of each week rather than, say, at the beginning of each week (i.e., if the reactor is shut down immediately after a delta-function energy pulse rather than if it is shut down

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just before the next one is due). Neither Exhibit "A" nor the 8/25/82 response letter indicates which assumption was made in the model used to produce the numbers in paragraph three of Exhibit "A". I then used this same program to calculate dose rates for delays other than 1, 2, 3, or 4 weeks.

6. The figures in Exhibit "A" are relevant for doses from the (presumed) entire unshielded reactor core. However, on the assumption that the appropriate dose relevant to theft is the dose from a single detached fuel bundle of the twenty-four total bundles in the core, the doses must be redetermined. The Exhibit "A" calculation assumed exposure at a distance of three feet from the core surface and thus four feet from the core center. It also apparently approximated the dose as originating entirely at the core center instead of distributed throughout the core. (It is likely, according to my calculations, that this last approximation will indeed cause less than a ten percent error.)
7. I have assumed in subsequent calculations that, upon separating a single one of the twenty-four core fuel bundles from the remainder of the core, one twenty-fourth of the radioactivity accompanies the bundle. It is possible that in fact some bundles are more radioactive than others at the time of a shutdown. In the absence of any data in the supplied information regarding radioactivity distribution in the core, I have assumed the distribution to be homogeneous. This is conservative with respect to fuel self-protection since the thief, equally uninformed, might reasonably assume the outer bundles to be safest and remove them; my assumption of homogeneity produces a bundle dose rate higher than these possibly below-average outer-bundle dose rates.
8. The exposure due to a single fuel bundle at a distance of three feet from that bundle will then be less than that due to the whole core by a factor of twenty-four; but it will also be greater by a factor of $(4/3)^2$ due to the decreased distance to the center of the radiating source, assuming (as does Exhibit "A") that all radiation equivalently originates at the source center.
9. My results are as follows (please see next page):

time after shutdown	seconds							100
	hours						8	
	days	28	21	14	7	1		
dose rate, r/hr at	Exhibit "A" whole core (for compar- ison)	83	91	107	142			
three feet	core, end- of-week pulse	88	98	114	149	452		
	core, begin- ning-of-week pulse	83	91	102	122	174		
	single fuel bundle, end-of week pulse					33.5	92	
	single fuel bundle, beginning-of- week pulse							34

10. All other things being equal, it is more conservative to assume pulses in the beginnings of the weeks, since this yields lower dose rates. The conservative single fuel bundle dose at three feet is only (approximately) 34 r/hr at the shortest delay following shutdown for which the equation in Exhibit "A" is valid, i.e. 100 seconds. For the least conservative situation, i.e. where the reactor is shut down immediately after a delta-function energy pulse, a dose rate of 100 r/hr at three feet occurs for a single fuel bundle only following delay times after shutdown of less than approximately eight hours.

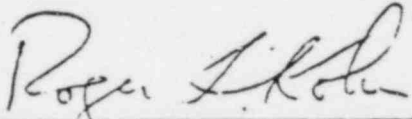
11. If the weekly-period model is used in lieu of an actual operating schedule, the safest assumption would be the conservative one, i.e. that each week's non-constant fraction of the reactor energy is generated early in the week, and that if the reactor is suddenly shut down and the fuel bundles removed, the energy for the most

recent week was generated nearly a week previous to that shutdown. In such a case, using the same numbers, equations, and approximations as those in Exhibit "A" and the subsequent letter, a single detached fuel bundle cannot be considered theft-proof by virtue of a sufficiently high dose rate, to wit, one of at least 100 r/hour at three feet.

12. The weekly-periodic function assumed in Exhibit "A", 3a), is only a reasonable, conservative approximation to the real operation if the reactor is in fact operated to generate at least 200 kwh of energy in each of the weeks preceeding the shutdown.
13. I have not at this time independently verified the accuracy or applicability of the equation and numbers supplied by Exhibit "A" and the subsequent letter. I here only determine the dose rate from a single detached fuel bundle based on their assumed accuracy and applicability to the whole core.

I declare under penalty of perjury that to the best of my knowledge and belief the foregoing is true and correct.

Executed on September 4,
1982, at Manhattan Beach,
California


Roger L. Kohn, Ph.D.

DOCKET NUMBER

PROPOSED

PR-50 (12)
(49 FR 27769)

City of Detroit

CITY COUNCIL

RECEIVED

DOCKETED
USNR

MARYANN MAHAFFEY
COUNCIL MEMBER

'84 AUG 30 A9:01

'84 AUG 20 P12:39

PUBLIC USE

DOCKETING & SERVICE
BRANCH

August 14, 1984

Docketing and Service Branch
Secretary of the Commission
Nuclear Regulatory Commission
Washington, D.C. 20555

To Whom It May Concern:

I am writing in support of the proposed rule requiring nuclear research reactors to convert from highly enriched uranium to low enriched uranium. I also believe the conversions should be effective as soon as possible, not in five or ten years.

The University of Michigan is already in the process of conversion, yet the existence of 23 universities using HEU is a threat to all of us.

I urge you to eliminate this threat by implementing the proposed rule.

Sincerely,

Maryann Mahaffey
Maryann Mahaffey, ACSW

MM:lh

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all William R. L. 11/3/84

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Acknowledged by card

8/21/84

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PROPOSED RULE PR-50 ②
(49FR 27769)

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USARC

'84 AUG 22 A8:58

'84 AGO 10 P12:31
PUBLIC DOCUMENTS

RECORDS & SERVICE
DOCKETING & SERVICE
BRANCH

MEMO

from

DEBORAH A. COHEN, M.D.

8/5/84

Dear Mr. Secretary:

I am writing to tell you of
my support of the new rule to
require research reactors to switch
from highly enriched to low-
enriched fuel. This should be
implemented as soon as possible.
Any steps such as this ~~taken~~ will
reduce the all-too-dangerous
situation of the proliferation and potential
use of weapons-grade uranium.
Keep me informed of your
decisions.

Truly,

Sincerely,

Deborah A. Cohen

DEBORAH A. COHEN, M.D.

1847 NORTH KINGSLEY DRIVE
LOS ANGELES, CALIFORNIA 90027

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PDR PR
50-49FR27769 PDR

DSIS

1130-33

Acknowledged by

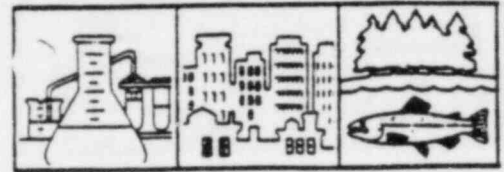
8/13/84

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EIP/California

Eastern Columbia Building #829
849 South Broadway
Los Angeles, California 90014-3573
(213) 622-0029

PROPOSED RULE **PR-50** (10)
49FR27769



8/14/84

Secretary of the Commission
Nuclear Regulatory Commission
Washington D.C. 20555

'84 AGO 17 P12:28

Attention: Docketing and Service Branch

August 14, 1984

Dear Secretary,

It is my firm conviction that your proposed rule to require some 30 research reactors to convert from HEU fuel to LEU fuel is crucial and must be adopted without dilution. Any chance, even remote, that an academic tool could be commandeered for bomb-making purposes must be eradicated.

I believe that this rule should take effect as soon as possible, and that no reactors should be exempted. In light of the fact that the University of Maryland and other schools have already made a successful switch, I believe the rule has quite a bit of evidence in its favor.

Thank you for your consideration. I hope that soon all small reactors are operating on LEU fuel.

Sincerely,

[Signature]
Howard Cushnir
Regional Director

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p2
Handwritten by card...

D-10
William R. Hicks 113055
Southern California

A program of The CEIP Fund, Inc.
Pacific Northwest • Great Lakes • Northeast • California

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JOURN NUMBER
PROPOSE RULE PR-50 (36)
(49 FR 27769)

Wendy Schnelker
Box 1186
Ben Lomond, CA 95005
August 29, 1984

Attn: Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

9/5/84

RE: HEU Conversion Rule (49 Federal Register 27769)

SEP 16 1984
Dear Sir/Madam,

PUBLAS a citizen concerned about nuclear proliferation and the threat of nuclear theft and diversion related to research reactors. I strongly support a strong, mandatory HEU conversion rule. The passage and strict enforcement of this rule would help to regain U.S. credibility on nuclear non-proliferation matters; but only if no extensions, loopholes, or delays were granted. LEU fuel is now available, and thus there should be no reason not to convert which out-weighs the importance of doing so, immediately, both in terms of international standing as well as our own domestic safety and security. Let's not wait for an "incident" to occur; take the initiative to protect the people and reputation of our nation: pass and enforce promptly the HEU fuel conversion rule--and don't gut it with drawn-out implementation schedules and exemptions and loopholes.

Thankyou for your consideration.

Sincerely,

Wendy Schnelker
Wendy Schnelker

8409070191 840905
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50 49FR27769 PDR

DS 10
Add William R. Laks
113055

1/0

acknowledged, and... 9/5/84
p2

3-50 (39)
(49 FR 27769)

Sept 1, 1984

04 SEP-5 P4:05

Attn: Docketing & Service Branch
 Secretary of the Commission
 U.S. Nuclear Regulatory Commission
 RE: ~~He~~ Conversion Rule
 (49 Fed. Reg. 27769)

Dear Sir:

We are writing to support
 conversion of all nuclear reactors
 which use highly enriched
 uranium.

This atomic weapon material
 poses a threat to national
 and international security.
 The reactors must be converted
 now before the possibility
 of theft. The cost of this
 conversion is insignificant
 compared to the danger.

Thank you for your
 consideration.

Sincerely,
 Karl Smith, Esq.

P.O. Box 135
 Pescadero, CA 94060

DS10

100-100000-10

9/5/84

pd

PROPOSED FILE PR-58 (38)
(49 FR 27769)

12212 Gault Street
North Hollywood, CA 91605
August 28, 1984

Secretary of the Commission
Nuclear Regulatory Commission
Washington D.C. 20555
Attention: Docketing & Service Branch

Re: NRC Proposal to Require Use of Low-Enriched Uranium
Fuel in Non-Power Reactors

'84 SEP-5 P4:04

To The Secretary Of The Commission:

I strongly support the Nuclear Regulatory Commission's proposed rule to convert non-power reactors to use of low-enriched uranium fuel ("LEU"). I agree with the Commission's statement in its July 6, 1984 News Release that the new rule could reduce the risk of theft or diversion of highly enriched uranium ("HEU") and could influence foreign operators of non-power reactors to also convert to LEU. As physicist Theodore B. Taylor said last January in his testimony before the NRC, the presence of HEU in non-power reactors with very lax security is "highly undesirable and dangerous" and there are no research-related reasons which justify the continued use of HEU fuel in these reactors.

Because of this tremendous threat to U.S. security posed by the presence of HEU in non-power reactors, the Commission should require all such reactors to convert to LEU use at the earliest, physically possible date. I recognize that the conversion of all facilities could cost as much as \$15 million and some facilities might have a "unique purpose" for utilizing HEU. However, in light of the security risks posed by non-power reactor HEU fuel usage, these and other factors such as reactor usage and availability of suitable LEU should not be permitted in anyway to slow down or interfere with the conversion process.

Sincerely,

Debora B. Gelberg
Debora B. Gelberg
Law Student
Northeastern University

DSIC
a.w. William R. Laks
1130 SS

1/0

8/30/84
pk

DOCKET NUMBER
PROPOSED RULE PR-58 (37)
(49 FR 27769)

August 21, 1994

Attn: Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: HEU Conversion Rule (49 Federal Register 27769)

'84 SEP -5 P3:42

Dear Sir:

I am writing to support conversion of all nuclear reactors which use highly enriched uranium. Let us not bungle this nuclear fiasco any farther. Highly enriched uranium ~~is~~ serves as bait for terrorists who want to threaten the peaceful transformation that is now taking place. The financial cost of conversion is insignificant compared to the potential costs involved if a successful theft of fuel were carried out.

Please, be thoughtful and sensitive. Conversion of these reactors and removal of the weapons-grade fuel can be a signal to the rest of world that the U.S. takes seriously the problem of nuclear weapons proliferation. This proposal could help to discourage the use of HEU fuel worldwide.

In order to be effective, this action must be non-voluntary and it must be implemented properly.

Thank you for taking this action,

Christopher Ortolano
115 0th Street
Santa Cruz CA 95065

DSIO
add William R Lato
113055

Acknowledged by card 9/5/84
pd

DOCKET NUMBER
PROPOSED RULE PR 50 (35)
(49 FR 27769)

260 High St.

Sanfa Cruz, California SEP -5 P3:33

95060

August 25, 1984

Attention: Docketing & Service Commission
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington D. C. 20555

Dear Sir,

I wish to support conversion of all nuclear reactors which use highly enriched uranium. Because this material can be used in atomic weapons and could fall into the hands of terrorists, I consider it's use to be very hazardous. These conversions should take place without delay,, and no reactors should be exempt from the rule. Not only would this ruling help discourage the use of this sort of fuel worldwide, it would be a first step in stopping nuclear weapons proliferation.

Sincerely,

Virginia Kusinak

Virginia Kusinak

This letter regarding HEU Conversion Rule
(49 Federal Register 27769)

DS10
William R. Hicks
11/20/85
1/0

9/5/84 pd



DOCKET NUMBER
PROJ ID RULE PR-50 (34)
(49 FR 27769)

ASSOCIATED STUDENTS

364 Memorial Union • (916) 752-1990

August 29, 1984

Attn: Docketing & Service Branch
Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington D.C. 20555

'84 SEP -4 P5:32

DOCKETING
SERVICE
BRANCH

RE: HEU Conversion Rule (49 Federal Register 27769)

Dear Sir:

I am writing to support the conversion of highly enriched uranium reactors.

HEU, usable in atomic weapons, poses a threat to national and global security. We need not wait for this fuel to be stolen to begin the conversion process. As the undergraduate representative to the U.C. Student Body Presidents Council from Davis I am especially concerned with reactors on Santa Barbara and Los Angeles U.C. campuses, but we should aim at converting all HEU reactors that can operate equally as well with LEU.

Conversion of these reactors and removal of the weapons-grade fuel can be a signal to the rest of the world that the U.S. takes seriously the problem of nuclear weapons proliferation. This proposal could help discourage the use of HEU fuel worldwide.

Thank you for your consideration.

Sincerely,

Joseph Mele

Joseph Mele
ASUCD Vice President
UCD SBPC Representative

acknowledged by card 9/5/84
pd

University of California, Davis 95616

UNIVERSITY OF CALIFORNIA, SANTA CRUZ

SECRET NUMBER
PROPOSED E PR-58 (33)
(49 FR 27769)

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



SANTA BARBARA • SANTA CRUZ

Kevin Gillis
REPRESENTATIVE TO THE
STUDENT BODY PRESIDENTS' COUNCIL

CAMPUS ACTIVITIES OFFICE
SANTA CRUZ, CALIFORNIA 95064
August 27, 1984

Att: Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

'84 SEP -4 P4:55

'84 SEP 14 P12:40

PUBLIC

Re: HEU Conversion Rule (49 Federal Register 27769)

Dear Sir:

I am writing in support of a rule requiring the conversion of all nuclear research reactors from weapons grade (highly enriched) uranium to the non-bomb grade (low enriched) uranium. The students of the University of California at Santa Cruz are concerned with the potential threat and danger of using weapons grade uranium on university campuses with very minimal security.

The NRC should focus its decision on public health and safety concerns and not on the cost of conversion. The cost of conversion is minimal compared to the potential cost and damage in the event of a terrorist attack or a natural disaster.

The use of "generic envelopes of safety limits" is unwise in our view. The NRC should require that the research reactors prove that conversion has not reduced the reactors safety. Whenever there is a question of public health or safety the public should be allowed to address these questions through a public hearing.

The students of UC Santa Cruz encourage the Department of Energy's RERTR program. However, at present technology exists to convert all HEU research reactors to LEU fuel. Thus HEU conversion should continue regardless of the DOE's decision to fund the RERTR program.

We are also concerned with the time frame for conversion and the possibility of exemptions. The regulation requires the licensees to submit a proposed schedule of conversion within 12 months of the rules passage. One year is too long. These proposals should be submitted within a few months and the NRC should establish a date by which conversion must be completed. The possibility for exemptions should be strengthened. If the purpose of the regulation is to promote national and international security, then any exemptions impede that purpose.

The 7,000 graduate and undergraduate students of the university of California at Santa Cruz encourage unanimous support and enforcement of conversion of HEU fuel to the safer LEU fuel.

Sincerely yours,

Kevin Gillis

Kevin Gillis

Social Responsibility Committee

Acknowledged by card 9/5/84 p.h.

DSIC
10/1/84
8409060306 840904
PDR PR
50 49FR27769 PDR

GOVERNMENT OF THE STUDENT BODY

58 MEMORIAL UNION
AMES, IOWA 50011
PHONE 515-294-1585



President
MICHAEL REILLY

Vice President
MERRY MATHES

DOCKETED
USNRC

August 29, 1984

'84 SEP -4 P3:52

DOCKET NUMBER

PROPOSED RULE

PR-50

(49 FR 27769)

(31)

DOCKETING & SERVICE
BRANCH

Attn: Docketing & Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

RE: HEU Conversion Rule (49 Federal Register 27769)

My letter is to encourage the Nuclear Regulatory Commission to require that all nuclear research reactors convert from use of HEU to low enriched uranium.

This material poses a serious threat to the well being of everyone at Iowa State University. The possibility of this material falling into the hands of those who would use it for weapons purposes is even more frightening. We cannot afford to wait for this to happen.

We would like the Nuclear Regulatory Commission to take immediate steps toward implementing these changes. We are also encouraging the administration at our campus to support these changes.

Thank you for your consideration.

Sincerely,

Michael Reilly
GSB President

d1h

11-6-84

1/0

Acknowledged by card...

9/5/84

pd

SOUTHERN CALIFORNIA FEDERATION OF SCIENTISTS

3425 McLaughlin Avenue, Suite 209
Los Angeles, California 90066

August 28, 1984

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

'84 SEP -4 P4:25

Dear Mr. Secretary:

The Southern California Federation of Scientists supports the Nuclear Regulatory Commission's proposed rule which would restrict the use of highly enriched uranium (HEU) in U.S. research and test reactors, (49 Federal Register 27769), with the following qualifying remarks.

The rule is intended to reduce the risk of theft or diversion of HEU by replacing it with LEU; to encourage similar conversion of research and test reactors by foreign reactor operators; and thereby to reduce the amount of HEU fuel in international use. In order to achieve these aims, the rule must be strictly applied and quickly implemented.

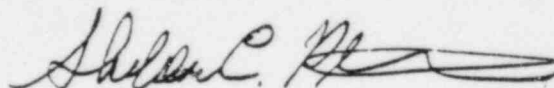
A "unique purpose" should not be sufficient basis for an exemption from the rule. The reactor function which requires HEU ought to be not only unique, but of vital significance to national security. We know of no such function which could not be performed using LEU.

Conversions should be carried out within one year of the date that the necessary LEU becomes available. Deferrals, like exemptions, should be granted only when justified by national security needs. Financial considerations, availability of shipping casks, or pattern of reactor usage obviously do not constitute such justification.

No license amendment should be required unless current safety margins are reduced by conversion to LEU. In such a circumstance, license amendment should be required. A "generic envelope of safety limits" should not be used to conceal a decrease in reactor safety.

Thank you for your consideration.

Sincerely,



Sheldon C. Plotkin, Ph.D.
Co-Chair

Acknowledged by card 9/5/84
pt

1/0

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

OFFICE NUMBER PR-50 (19)
PROPOSED RULE 144 2 27769

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



SANTA BARBARA • SANTA CRUZ

GRADUATE STUDENTS' ASSOCIATION
244 MILLBERRY UNION
UNIVERSITY OF CALIFORNIA

RECEIVED

SAN FRANCISCO, CALIFORNIA 94143

'84 SEP 10 P1:25

DOCKETED
USING

'84 AGO 27 P4:52

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

August 22, 1984

PUBLIC DOCUMENT

Attn: Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: HEU Conversion Rule (49 Federal Register 27769)

Dear Sir:

As representative to the University of California Student Body President Council from the San Francisco campus, I am writing to support the regulation that would require owners of non-power reactors to use low-enriched uranium fuel rather than high-enriched uranium fuel.

The regulation in question would reduce the threat of theft of weapons grade material and would encourage a reduction in the use of highly enriched uranium fuel world wide. If implemented, it could be a significant achievement in nuclear non-proliferation.

Expedience in this matter is of utmost importance. Thank you for your consideration.

Sincerely,

Louise Bourassa

Louise Bourassa
President, External Affairs

8408310154 840827
PDR PR
50 49FR27769 PDR

388

DS1010
add William R. Laks
113055

Acknowledged by card

8/29/84
pd



Graduate Assembly

Anthony Hall • University of California • Berkeley, California 94720 • 642-2175

DOCKET NUMBER

PROPOSED RULE

PR-50
(49 FR 27769)

(18)

21 August 1984

Attn: Docketing and Service Branch
Secretary of the Commission
Nuclear Regulatory Commission
Washington, D.C. 20555

DOCKETED
USNRC

'84 AGO 27 A11:10

DOCKETING & SERVICE
BRANCH

Dear Sir:

I am writing you to express my concern over the 23 nuclear reactors used around the country on various university campuses for training nuclear engineers and for medical research.

As you know, the Highly Enriched Uranium (HEU) Conversion Rule (49 Federal Register 27769) requires that these nuclear research reactors convert from HEU to Low Enriched Uranium (LEU). The HEU used now in the reactors is dangerous not only because it is weapons-grade material, and poses a potential threat should it get into the wrong hands, but this fuel must also be transported through highly populated areas both to and from the reactor sites.

A New York Times article states that the conversion would cost about \$15 million. Such a cost is petty cash when compared to the social costs involved should the fuel be stolen or allowed to escape through transport.

I therefore urge you to take immediate action on the implementation of the HEU Conversion Rule. Do not leave it up to each campus to decide for itself. Voluntary action in this case will not best serve to benefit the majority of U.S. citizens.

Thank you for your time and consideration.

Sincerely,

RHA R

Robert A. Rice
Co-chair, External Affairs

DSIO 110
add William R. Laks
113055

Acknowledged by card

8/29/84

ad

DOCKET NUMBER

PROPOSED P

PR-50

(49 FR 27769)

(17)

Associated Students of the University of California

DAVIS • BERKELEY • SAN FRANCISCO • SANTA CRUZ • IRVINE • RIVERSIDE • LOS ANGELES



SANTA BARBARA • SAN DIEGO

STUDENT BODY PRESIDENTS' COUNCIL

DOCKETED
USNRC

'84 AGO 27 AM 1:10

Attn: Docketing & Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

RE: HEU Conversion Rule (49 Federal Register 27769)

Dear Sir:

I am writing to support conversion of all nuclear reactors which presently use highly enriched uranium.

This material, which can be used in an atomic weapon, poses an unnecessary threat to national and international security. We should not wait until such fuel is stolen; we must convert these reactors now. The financial cost of conversion is insignificant compared to the potential costs involved if a successful theft of the fuel were carried out.

Conversion of these reactors and removal of the weapons-grade fuel can be a signal to the rest of the world that the U.S. takes seriously the problem of nuclear weapons proliferation. This proposal could help to discourage the use of HEU fuel worldwide.

But in order to be effective, it must be non-voluntary and it must be promptly implemented.

Thank you for your consideration.

Sincerely,

Raymond R. Cruz

External Affairs President of the
University of California, Riverside

DS10 1/0
ack William R. Laks
113055

Acknowledged by card

8/29/84
pd

UNION OF CONCERNED SCIENTISTS

1346 Connecticut Avenue, N.W. • Suite 1101 • Washington, DC 20036 • (202) 296-5600

November 2, 1984

Docketing and Service Branch
Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

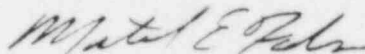
Re HEU Conversion of nonpower reactors
(Proposed rule, 49 FR 27769)

The Union of Concerned Scientists wishes to be recorded as strongly supporting this rule as proposed by the Commission. Its adoption would represent a modest, but nonetheless important, step toward reducing the availability of weapons-grade materials not only in this country but (through example) around the world.

The proposed rule takes a fair, balanced and quite patient approach toward mandating the conversion of nonpower research and test reactors from highly enriched uranium (HEU) to low enriched uranium (LEU). We would perhaps prefer a more strict rule, mandating such conversion within a time certain subject only to the availability of acceptable alternative fuel. But we understand (although we do not fully endorse) the real-world reasons why the Commission proposes to include "financial support" (i.e. government subsidies) among the factors to be considered in assessing each licensee's fuel replacement schedule. Given that concession, we certainly do not see any reason to insert any exceptions in the rule as proposed.

Adoption of this rule would further a consistent U.S. nonproliferation policy and demonstrate that this country is serious about reducing the risks associated with the use of nuclear technology. UCS urges the Commission to speedily adopt a final rule no less stringent than that proposed.

Respectfully submitted,



Michael E. Faden
Legislative Counsel

841166366 TP

Congress of the United States
House of Representatives
Washington, D.C. 20515

HENRY A. WAXMAN
24TH DISTRICT, CALIFORNIA

ENERGY AND COMMERCE
CHAIRMAN, SUBCOMMITTEE ON
HEALTH AND THE ENVIRONMENT
GOVERNMENT OPERATIONS
BURT HOFFMAN
ADMINISTRATIVE ASSISTANT

October 11, 1984

Samuel J. Chilk
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Docketing & Service Branch
Washington, D.C. 20555

Dear Mr. Chilk:

The U.S. Nuclear Regulatory Commission, in August 1982, proposed to exercise its licensing authority to reduce "to the maximum extent possible" the use of highly enriched uranium (HEU) in reactors under its direct control. In the interests of national and international security I urge the commission to promptly implement this proposal.

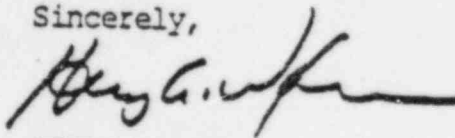
The NRC could greatly minimize the risk of theft or diversion of the weapons-grade material HEU by requiring reactors to convert to low-enriched uranium (LEU). This conversion would not only reduce the risk of the weapons-grade fuel being stolen by terrorist groups or nations intent on acquiring nuclear weapons, but would also serve as proof to other nations that the United States is committed to nonproliferation of nuclear weapons.

HEU is an essential ingredient in making nuclear weapons, but this bomb-grade uranium is not an essential ingredient to the operation of the 46 reactors in this country which use it.

I commend the NRC for proposing the necessary action needed to reduce the grave and serious threat of the availability of HEU. Please accept this letter as a record of my support of the proposal before the deadline for public comment expires on November 2, 1984.

With kind regards, I am

Sincerely,



HENRY A. WAXMAN
Member of Congress

HAW:kl

cc: Nunzio J. Palladino
Steven Aftergood

8410240219 298

DOCKET NUMBER

PROPOSED RULE

PR-50
(49 FR 27769) (78)

RECEIVED

'84 OCT 32 A9:38

October 14, 1984

'84 OCT 19 P1:36

PUBLISHED

Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

DOCKETING & SERVICE
BRANCH

Dear Commissioners:

This is just a short note to inform you that we strongly support your proposal to convert the 31 nuclear reactors around the U. S. to low-enriched fuel. The potential risk for nuclear weapons proliferation in this age of rising world wide terrorism should be checked and limited whenever possible. Thank you for your consideration of this vital matter.

Yours very truly,

Lawrence Miles

Mr. & Mrs. Lawrence Miles
1046 Brighton Ave.
El Centro, CA. 92243

8410240219 841019
PDR PR
50 49FR27769 PDR

Acknowledged by card

10/22/84
pd

MEL LEVINE
4TH DISTRICT, CALIFORNIA

COMMITTEES:
COMMITTEE ON FOREIGN AFFAIRS
COMMITTEE ON GOVERNMENT
OPERATIONS

Congress of the United States
House of Representatives
Washington, D.C. 20515

WASHINGTON OFFICE
802 CANNON HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20518
TELEPHONE: 202 225 8481

DISTRICT OFFICE:
6250 WEST CENTURY BOULEVARD
SUITE 447
LOS ANGELES, CALIFORNIA 90048
TELEPHONE 213-642-3939

October 17, 1984

Mr. Samuel J. Chilk
Secretariat
Office of the Secretariat
Docketing and Service Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Chilk:

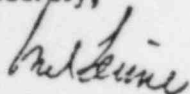
I am writing regarding the Nuclear Regulatory Commission's proposal to require owners of non-power reactors to use low-enriched uranium fuel in place of the highly-enriched uranium currently used. I strongly support this proposed NRC rule.

Eliminating the use of bomb-grade quality uranium in research reactors will reduce the possibility of theft by terrorists, and its subsequent diversion to weapons use. It will demonstrate a commitment by the United States to the non-proliferation of nuclear weapons and will reduce the amount of highly-enriched uranium available internationally.

It is my understanding that domestic research will not suffer with the use of low-enriched uranium. That being the case and since in some instances individual schools have in their possession enough kilograms of highly-enriched uranium to build an atomic bomb, the conversion should be implemented as soon as it is economically feasible to do so.

I appreciate having this opportunity to express my views in support of the NRC proposed rule.

Sincerely,



Mel Levine
Member of Congress

ML/ams
cc: Chairman Nunzio Palladino

2410240205 / P.

United States Senate

WASHINGTON, D.C. 20510

November 1, 1984

Mr. Nunzio J. Palladino
Chairman
Nuclear Regulatory Commission
1717 H Street, N.W.
Washington, D.C. 20555

Dear Joe,

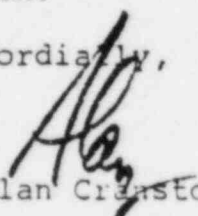
I'm writing to voice my strong support for the Nuclear Regulatory Commission's pending proposal requiring nuclear reactors to switch to low-enriched uranium (LEU) from the high-enriched uranium (HEU) currently in use. As you are aware, I've been deeply concerned about the risks of nuclear proliferation for many years.

In my view, the pending proposal is eminently sensible. With the development of LEU replacement fuels, continued use of HEU in nuclear reactors presents a national as well as international security risk and a temptation for terrorists that should be removed. It would be a terrible tragedy to wait until the danger materializes, rather than eliminating the risk now.

It is simply blind-sighted to continue to permit weapons-grade uranium to be stored and used in areas of minimal security when reactors can now be converted relatively inexpensively to LEU fuels that can't be used to make bombs, but will run the reactors just as well. America's commitment to eliminate the threat of nuclear terrorism and to help stop nuclear proliferation must be demonstrated in both words and action.

I'm delighted that the NRC has made this well-thoughtout proposal to eliminate the use of HEU in nuclear reactors and urge its prompt adoption.

Cordially,


Alan Cranston

cc: Mr. S. Aftergood, CBG
Office of the Secretary,
NRC, Docketing & Service
Branch

84-1105-1384 TP.

BUCKET NUMBER

PROPOSED RULE

PR- 1 (91)
(49FR 27769)

October 12, 1984

'84 OCT 26 A10:18

'84 OCT -8 A10:39

Statement of RONALD BAKAL, Esq.

PUBL

Before

The Subcommittee on Energy Research and Production
and

The Subcommittee on Energy Development and Applications
of the

House Committee on Science and Technology

My name is Ronald Bakal. I am an attorney and a member of the Nuclear Law Center, a group of public interest attorneys who assist public groups in nuclear cases. We have been deeply involved in matters in which a public group challenged the adequacy of security at a local research reactor because it possessed weapons-grade nuclear materials with grossly inadequate security.

I understand the NRC has proposed a new regulation which would require research reactors to convert from weapons-grade fuels to low enriched, non-weapons-grade material. The rule has two purposes: to provide protection against the unique risks associated with potential theft of material from which a nuclear bomb could be manufactured, and to remove a major obstacle to completing a long-standing foreign policy objective of converting foreign research reactors from highly enriched uranium (HEU) and reducing the amount of such weapons materials that are internationally available for theft or diversion to weapons purposes.

127010
Adm. Williams P. L. L. S.
113155

8410310336 841012
PDR PR
50 49FR27769 PDR

Assigned to: 10/29/84

3pp

pd

Despite the fact that conversion seems to be a relatively quick and simple matter-- DOE simply retrieving the HEU fuel it has loaned these reactors and substituting LEU replacement fuel-- and despite the fact that it appears Congress is to pick up the tab involved, and has already appropriated a substantial portion of it, there remains some residual opposition among the potentially affected licensees. Some of the arguments appear particularly irrational, as the one that requiring conversion to LEU will cause public outcry and legal interventions against the research reactors. Exactly the opposite is the case.

UCLA, a reactor with HEU fuel, closed down permanently and withdrew its renewal application a week before it was to go to hearing on the serious inadequacies in its security. Intervenors wanted it to convert to LEU; it resisted. As in all cases to date, Intervenors have opposed the presence of HEU and urged replacement with LEU; it has never been the other way around.

Reactors with HEU fuel cannot meet their burdens in demonstrating sufficient security to protect against theft of weapons-grade materials. If reactor operators have legal concerns, conversion is the best answer for them, because the security needs go down, as well as public concern.

Of the hundreds of license amendments for research reactors, there has never been an Intervenor, even in matters far more controversial than conversion and where the change was clearly in the unsafe direction (e.g., an order of magnitude increase in power) as opposed to the clear reduction in risks involved with removing weapons-grade fuels from campuses. No interventions can be expected to occur in license amendment cases for HEU conversion, but they can be virtually guaranteed if these reactors do not convert and keep bomb-grade materials on site. This is the single most aggravating issue to public groups concerned with research reactors in their neighborhoods, and failure to convert can be expected to result, particularly in light of the UCLA case, in a flurry of legal actions and other public opposition to continued presence of weapons-grade material in their communities.

UCLA withdrew its application for renewal of its full license in large measure because it had weapons-grade uranium on site and inadequate security. Research reactor operators who wish to avoid the same public outcry should not stand in the way of conversion to LEU; if the conversion rule is overturned, it will likely result in precisely the kind of opposition to their facilities they say they so desire to avoid.

Conversion from weapons-grade fuels is really in the best interests of all parties. Public groups want bomb materials out of their neighborhoods. Reactor operators want reduced security problems and reduced risk of public opposition. And we all want, don't we, reduced risks that a terrorist group or state might acquire a clandestine nuclear weapon. Clear-sighted perception of the issue would indicate that it is in everyone's interests to remove weapons-usable materials from underprotected locations here and abroad.

#

Ronald Bakal 10/23/84

Ronald Bakal, Esq.
8447 Wilshire Blvd.
Suite 300
Beverly Hills, CA 90211
(213) 655-0242

DOCKET NUMBER
PROPOSED RULE PR 50
(49 FR 27769)

(74)

DOCKET
USNRC

October 10, 1984

'84 OCT 15 P1:03

RECEIVED
'84 OCT 25 P7:21

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

Secretary of the Commission
Nuclear Regulatory Commission
Washington, D. C. 20555

I am writing to let you know that I strongly support the proposal before the Commission to require nuclear research reactors to convert from highly enriched uranium to low enriched uranium fuel.

I believe that these conversions should be implemented immediately, not at some date in the future. I also believe that they are vital to our safety and to our national security.

Thank you.

Sincerely,

Roberta Riley

Roberta Riley
8033 Rayford Drive
Los Angeles, California 90045

DS10 do
add Williams R Laks
11/2/84

8410170086 841015
PDR PR
50 49FR27,07 PDR

bp

Acknowledged by card 10/16/84
pd

10/11/84

ADMET NUMBER

PROPOSED RULE PR-38

(49 FR 27769)

(72)

Attn: Docketing & Service Branch
Sec. of Commission
U.S. Nuclear Regulatory Commission
Washington DC 20555

DOCKETED
USNRC

'84 OCT 15 P1:04

RE: HEU Conversion Rule

(49 Fed Register 27769)

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

Dear Sirs:

I am writing to express my concern about all nuclear reactors which use enriched uranium. I believe that the conversion of HEU fuel to LEU fuel is extremely urgent + important to the safety of us all. I am for the ~~to~~ scaling down of anything that could be used for a nuclear weapon. I don't believe it is necessary to have these materials available - material which could be used for an atomic bomb.

This conversion would be worth a great price to me + ultimately to the rest of the world, I believe.

Hope you will consider this an urgent and serious issue + implement this proposal which is before the Commission as soon as possible.

A concerned citizen + human being.

DSIC/10

200

William P. Lick

113055

Thanks.

Marcia D. Crews

11621 Ohio #5

LA, Ca 90025

10/16/84

turned to...

GEORGE E. BROWN, JR.
2258 HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20518
(202) 225-4181

COMMITTEES:
AGRICULTURE
CHAIRMAN, SUBCOMMITTEE ON
DEPARTMENT OPERATIONS, RESEARCH
AND FOREIGN AGRICULTURE

SCIENCE AND TECHNOLOGY

TECHNOLOGY ASSESSMENT BOARD

Congress of the United States

House of Representatives

Washington, D.C. 20515

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October 4, 1984

Docketing and Service Branch
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: NRC Proposal to reduce and/or eliminate use of
highly enriched uranium (HEU) in University research.

Dear Commission Members:

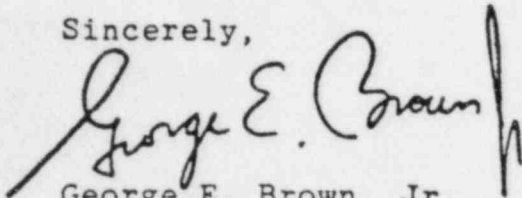
I am writing to support the proposal by N.R.C. to reduce and, if possible, eliminate the use of highly enriched uranium (HEU) in university research, and replace it with low enriched uranium. I do so in the interest of national security, safety, and in demonstrating the United State's commitment to non-proliferation of nuclear weapons.

Based upon my review of testimony made by Dr. Theodore B. Taylor before the Commission this issue, and my own legislative efforts to reduce the threat of nuclear weapons to our society, and to the earth as a whole, I believe I can whole heartedly endorse such a move to eliminate weapons grade fuel from research facilities engaged primarily in non-defense work. Dr. Taylor makes a sensible and knowledgeable case for replacing 93% HEU with perhaps 20% HEU or even 48% HEU at the colleges and universities presently authorized to store and maintain kilogram or more quantities of such fuel, and I will not go into detail on the adequacy of low enriched uranium as a substitute for HEU in university research projects; thus has already been done effectively elsewhere. I will, however, go on to say that any potential drawbacks in research, which would appear to be minimal, would be more than offset by the greater safety and security afforded our nuclear research institutions. Furthermore, despite the estimated \$15 million cost of replacing HEU with low enriched uranium regardless by whom such cost's borne, it is more than offset by the potential for damage and lives lost by the threat of nuclear extortion which presently exists, but would be virtually eliminated should the NRC proposal be accomplished. Even the expense for providing greater security for institutions requiring use of HEU is justified if it can serve to prevent nuclear terrorism on any scale.

Finally, I would hail the move by the NRC as a rational move toward a rational control of nuclear weapons proliferation; long overdue, but worthy nonetheless. I have strived, during my years in Congress to do my part to reduce the threat of nuclear destruction between the superpowers, and I see no contradiction in wanting to extend those efforts to reduce the threat of terrorist-mounted nuclear destruction. Rather, the proposal by the NRC indicates to me a willingness by the United States to stand by its pledge of nuclear non-proliferation by reducing the use, and likelihood of use, of nuclear weapons-grade fissionable material in non-defense research. I would frankly support any effort to further reduce the threat of nuclear weapon use and find in this proposal a most constructive plan to do just that.

I urge your consideration of my comments before concluding your action on the proposal now before you.

Sincerely,

A handwritten signature in dark ink, reading "George E. Brown, Jr." with a stylized flourish at the end.

George E. Brown, Jr.
Member of Congress

GEB:sds:vlr

DOCKET NAME

PROPOSED RULE

PR-50
(49 FR 27769)

(71)

DOCKETED
USNRC

'84 OCT 15 P1:03

OFFICE
DOCKET
U.S. NUCLEAR
REGULATORY
COMMISSION
DOCKETING & SERVICE
BRANCH

from the desk of

Dotty and Jack

3355 Bennett Drive
Los Angeles, CA 90068
October 11, 1984

Docketing & Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

It would mean a great deal to know that ^{you} will
support the proposal to convert 31 nuclear
weapons around the country to low-enriched
fuel, which cannot be used in a weapon.

This makes a lot of sense in our world today.

Your cooperation relative to this will be
very much appreciated.

Sincerely,

Dorothy Garber
Mr. & Mrs. Jack Garber

D-510110
add: William R. Laks
115555

Acknowledged by card

10/16/84

pd

PROPOSED RULE PR-50 (86)
(49 FR 27769)

Executive Board

Paul C. Warnke
Chairman of the Committee

James F. Leonard
Chairman of the Board

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Louise Mead Walker
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Stanley Weiss

Adam Yarmolinsky

Anne H. Cahn, Director

'84 121 -6 AM:26

PUBLIC -

October 22, 1984

'84 OCT 24 P2:40

DOCKETING & SERVICE
BRANCH

Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: HEU Conversion Rule (19 Federal Register 27769)

Dear Sir:

I am writing to you on behalf of the Committee for National Security, a public interest organization concerned with defense policy, to express strong support for the proposed rule that would require domestic research reactors to convert from the use of Highly Enriched Uranium (HEU) to Low Enriched Uranium (LEU), which, if stolen or diverted, could not be used directly to make an atomic bomb.

The proposed rule is consistent with long-standing U.S. policy discouraging use of HEU worldwide. Foreign research centers have expressed considerable reluctance to convert their reactors if U.S. reactors are not converted. U.S. conversion will show that the U.S. takes seriously the problem of nuclear weapons proliferation.

The proposed rule is prudent in light of the rise in terrorism worldwide and the risks to national security of a terrorist group obtaining weapons-grade material. The proposed conversion will be at U.S. government expense, as opposed to the cost of increased security that would be necessary at sites retaining HEU.

Conversion to LEU would not affect reactor performance. Many successful conversions have already taken place, such as at the University of Maryland's campus reactor. Conversions should be promptly carried out with no exemptions. Shifting to LEU will remove one of the major motivations for public intervention regarding these reactors.

Thank you for your consideration,

Cordially,

appetit

Anne H. Cahn
Director

The Committee for National Security
 10 P Street, NW • Suite 515 • Washington, DC 20036 • 202-833-3140

Reviewed by card. 10/25/84 *pd*



DOCKET
USNRC

DOCKET NUMBER

PROPOSED

(49FR 27769)

PR-50

(89)

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84 OCT 25 A10:37

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DOCKETING & SERVICE
BRANCH

10/25/84

Docketing & Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Friends:

We support your proposal to convert thirty-one nuclear reactors around the country to low-enriched fuel which cannot be used in a weapon. In view of the very dangerous situation confronting us with regard to nuclear weapons and the nuclear arms race, your proposal might serve to make the world just a little safer.

Sincerely,

Esther Schiller

Esther and Gerald Schiller

PUBL

84 OCT 25 A10:37

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PDR PR
50 49FR27769 PDR

10/25/84
pd

UNIVERSITY OF CALIFORNIA, SANTA CRUZ

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SANTA BARBARA • SANTA CRUZ

ADLAI E. STEVENSON COLLEGE

SANTA CRUZ, CALIFORNIA 95064

October 26, 1984

The Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
attention: Docketing & Service Section

RE: HEU Conversion Rule (49 FR 27769)

Dear Secretary Chilk:

Enclosed please find a copy of my statement to subcommittees of the House Science and Technology Committee on the issue of the proposed NRC rule on conversion of research reactors utilizing weapons-grade uranium. I would appreciate the enclosed statement being included in the comments to the NRC regarding the proposed rule.

I would make the following additional points as well:

It has been argued that since kilogram quantities of weapons-grade uranium have supposedly not as yet been stolen from research reactors in this country (although apparently such thefts have occurred from other domestic facilities utilizing HEU, such as NUMEC), there is no demonstrated threat to these facilities warranting replacing their HEU with LEU. Within this counter-argument to the proposed rule appears to be a serious misunderstanding of the concept of threat. The argument relies entirely on the absence of a threat having been carried out to date; however, a threat's inherent danger lies in possible future actions.

All the data (see the attached statement) indicate a rapidly escalating level of terrorist activity--in numbers of incidents, magnitude of casualties, sophistication of methods used, and in the numbers of nuclear incidents. There is thus clearly a threat at present. If the trends continue, the existing threat to these facilities (made much worse in the wake of the attacks on the Iraqi HEU-fueled research reactor) will continue to escalate.

The proposed rule is designed to respond not to past threats, but to the danger of future threats. Conversion, after all, will take several years. One can only hope that the rising lines in the graphs of terrorist incidents do not reach the point of theft of HEU from research reactors and detonation of a clandestine fission explosive before the proposed NRC policy of conversion can be instituted.

D51611

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Acknowledged by cert.

10/30/84

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Even if the trends were not convincing enough, we must remind ourselves that it only takes one act by one terrorist group to cause unacceptable damage. Terrorists live on the fringe of society. To expect all of these groups to behave within certain limits (e.g., not attempting to steal and use nuclear material), is imprudent. It would be relying on the fringe of society's fringe to act within rational limits. Recent events leave little hope that terrorists will act rationally.

The proposed conversion rule would eliminate the possibility of terrorist groups obtaining a nuclear capability. There seem to be no logical arguments to the contrary because:

- The government will pay for HEU replacement costs.
- The performance of the reactors will be essentially identical with LEU as with HEU.
- An exemption procedure is proposed for those two or three reactors who can make a solid case that conversion would make impossible their unique research.

Any delay or overturning of conversion means a very dangerous situation in the future when these same facilities face the far more dangerous world that appears ahead. The tragedies in Beirut are a powerful reminder of the danger that may result if comprehensive preventive measures against terrorist action are not taken in a timely fashion.

Sincerely,

Stephanie A. Murphy

Stephanie A. Murphy
Nuclear Terrorism Research Proje
Adlai Stevenson Program
on Nuclear Policy

October 12, 1984

RECORDED
INDEXED

'84 OCT 29 AM 11:55

STATEMENT OF
STEPHANIE A. MURPHY
NUCLEAR TERRORISM RESEARCH PROJECT
ADLAI E. STEVENSON PROGRAM ON NUCLEAR POLICY
UNIVERSITY OF CALIFORNIA AT SANTA CRUZ

BEFORE THE
COMMITTEE ON SCIENCE AND TECHNOLOGY
ENERGY DEVELOPMENT AND APPLICATIONS SUBCOMMITTEE
AND
ENERGY RESEARCH AND PRODUCTION SUBCOMMITTEE
U.S. HOUSE OF REPRESENTATIVES

My name is Stephanie A. Murphy. I am a researcher focusing on issues of terrorism and the threat terrorists pose to safety and security in the United States through assault on or theft from nuclear facilities. Although my research has been conducted in conjunction with the Nuclear Terrorism Research Project of the Adlai E. Stevenson Program on Nuclear Policy at the University of California at Santa Cruz, the views expressed here are my own and not necessarily those of the University of California.

Introduction

In the past decade, data on terrorist trends have increasingly indicated a growing necessity to safeguard nuclear facilities against actions by terrorists. Since 1972, international terrorism has taken on a heightened level of violence and frequency. The latest example of this trend has been the rash of embassy bombings in Beirut which have resulted in over three hundred deaths. The recurrence of the truck bomb attacks underline the vulnerability of U.S. facilities, especially politically symbolic ones, and indicate an increased risk for facilities at home.

Coinciding with increases in terrorist violence and the numbers of deaths caused per incidence has been a ten-fold increase in the number of nuclear-related incidents since the early 1970s. Though terrorists have apparently not yet acquired an atomic bomb nor used one, an act of nuclear violence could well be the next step in the trend of escalating terrorist activity.

The 1981 Israeli destruction of Iraq's Osirak research reactor, fueled with highly enriched uranium (HEU), broke through a psychologically important barrier by making nuclear facilities targets. Although the Israelis have said the attack was carried out to prevent the Iraqis from acquiring a nuclear bomb, the act may well have had the unintended additional effect of relaxing existing constraints on terrorists regarding nuclear violence. The destruction of the research reactor may well have established new political battlefields for terrorist activity.

Clearly, we have entered a new era involving a wider variety of terrorist threats. The embassy truck bombings in Beirut indicate that terrorists are willing to carry out attacks with the knowledge that the action will result in their own deaths. This, in conjunction with increased nuclear-related terrorism and the destruction of the Osirak research reactor, presents a horrifying picture of possible future actions.

At a time when terrorist violence is increasingly aimed at the United States and the terrorist desire for or the use of a nuclear capability is increasing in likelihood, it is absolutely necessary to provide for effective safeguards against this potential threat. Research reactors containing highly enriched uranium (HEU) would be a prime target for these acts by providing terrorist groups the opportunity to acquire bomb-grade uranium with relative ease. Research reactors are known to be significantly less protected than such Department of Energy weapons facilities such as the Los Alamos National Laboratory, yet the extent of even Los Alamos' ability to defend against nuclear theft was recently called into serious question in a series of safeguards tests in which it failed three out of three tests. In each case at Los Alamos, terrorists would have been able to successfully steal either weapons-grade materials or even a fully-assembled nuclear bomb. In this light, it is clear that HEU is presently not safe in the far-less-well protected research reactors.

Because many research reactors are at universities, it would be difficult to sufficiently upgrade safeguards to adequately protect against theft of HEU while maintaining a normal academic environment. The use of low enriched uranium (LEU) is thus a logical preventive step against terrorist assault and theft. The conversion to LEU would greatly reduce the terrorists' incentive for theft and would make research reactors less likely targets of terrorist attack.

Nuclear Terrorism

Nuclear terrorism can be viewed as a subset of terrorism, adhering to many of its tendencies and traits. Several character traits can be noted which are extremely important when considering terrorism in the nuclear sphere. A typical terrorist action carries with it not only the physical effects (e.g. kidnapping, bombing, embassy siege), but also a larger symbolic effect surrounding the object of the act itself (e.g. bombing on a national holiday, etc.). Traditionally, it is this symbolic impact that draws the public attention and presumably nets results, be they monetary, political, or simply increased terror and publicity itself.

Recently there have been reports written on the incidence of terrorism and the likelihood of increased and potentially catastrophic incidence of nuclear terrorism. Several of these reports¹ were prepared for the Rand Corporation by Brian Jenkins, who defines² terrorism as:

An act by an organized group with some kind of political objective, usually directed against civilian as opposed to military targets, usually a group that claims responsibility; it's carried out in a way to achieve publicity, and it's intended to produce psychological effects beyond the immediate physical effects.

In light of the deadly nature of nuclear materials, one must examine in some detail the rapidly changing nature of terrorism.

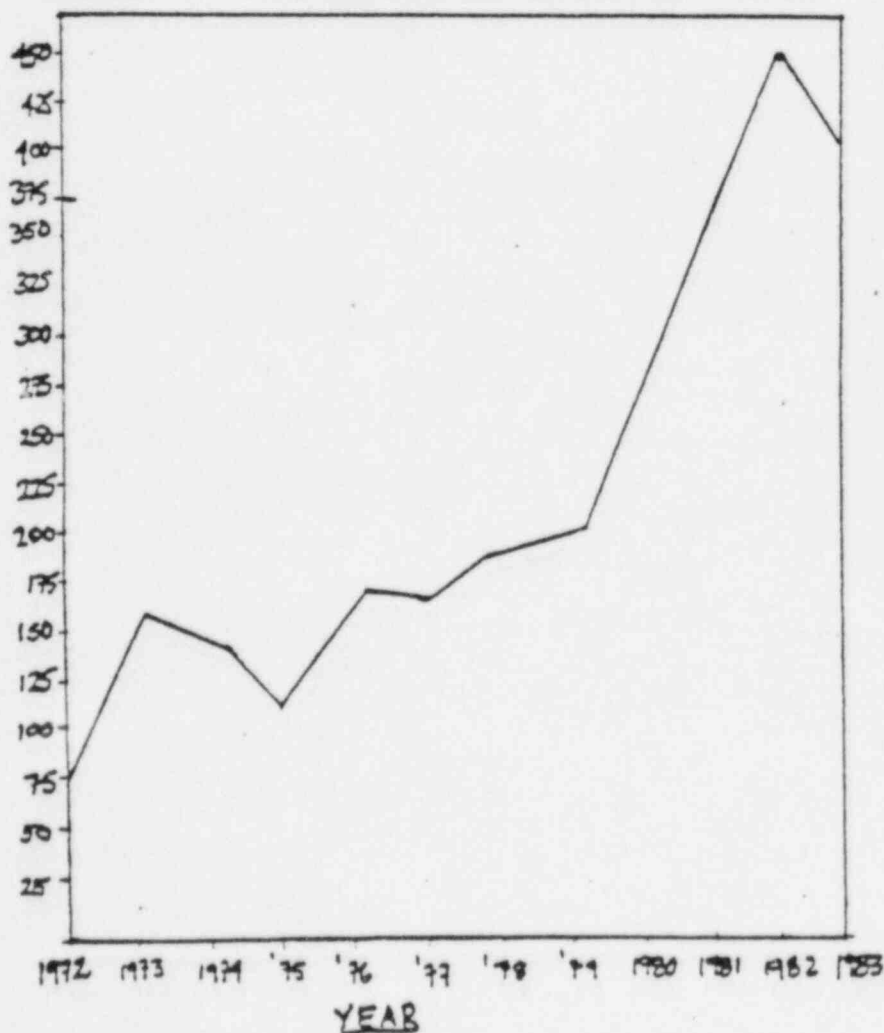
1. "Motivations and Possible Actions of Potential Criminal Adversaries of U.S. Nuclear Programs," January 1981, Rand Corp.; "The Appeal of Nuclear Related Crimes to the Spectrum of Potential Adversaries" February 1982, Rand; "A Review of Recent Trends in International Terrorism and Nuclear Incidents Abroad", April 1983, Rand

2 interview in San Francisco Chronicle, April 22, 1984

Increased Incidence and Magnitude of Terrorist Violence

Recent trends in terrorism indicate a weakening of moral and political constraints which some scholars had previously hoped would prevent terrorists from carrying out acts which could result in very large casualties. In general, the new data indicate an increase in numbers of terrorist incidents, numbers of casualties, and numbers of nuclear-related incidents. Figure 1 shows graphically the dramatic increase in terrorist incidents in the last decade or so, with the steepest rise in the last few years.

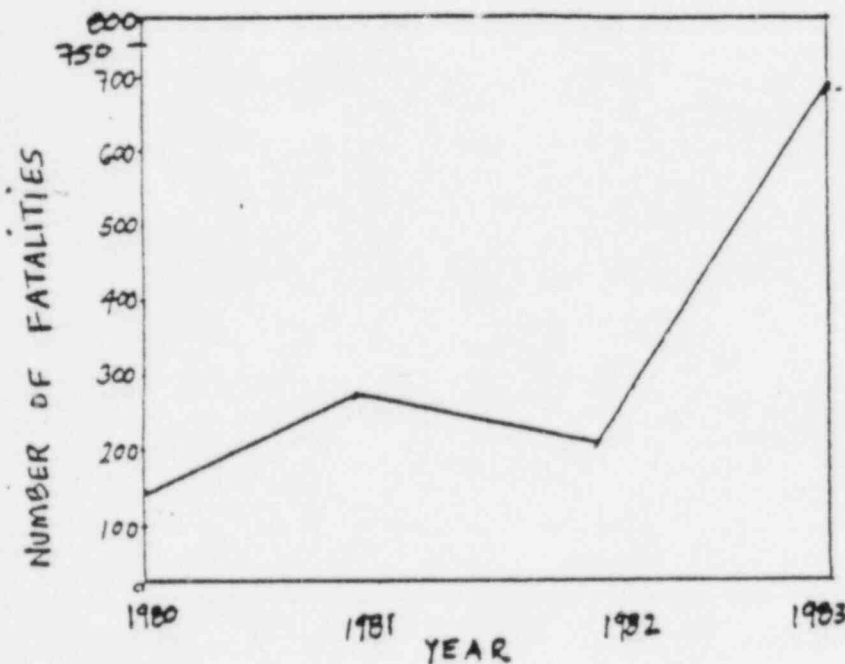
Figure 1. Number of Terrorist Incidents



source: "A review of Recent Trends in International Terrorism and Nuclear Incidents Abroad", Rand, April 1983; 1982 and 1983 Rand incidents figures from San Francisco Chronicle April 22, 1984

There has also been a significant escalation in the form that terrorist violence has taken since the mid-1970s, with terrorist activity becoming more sophisticated as well as demonstrating a willingness to kill ever greater numbers of people. This new scale of violence can be tracked through the 1972 Munich Olympics, to the attempts (twice successful) to shoot down airliners with ground-to-air missiles in Rhodesia during the late 1970s, to the recent truck bombings in Beirut. Statistics show that the number of fatalities in terrorist incidents are increasing dramatically. The number of incidents with fatalities increased during the 1970s and into the 1980s. The number of fatalities doubled from 1980 to 1981, and more than doubled again in 1983. (See figure 2).

Figure 2. Number of Fatalities



source: "A Review of Recent Trends in International Terrorism and Nuclear Incidents Abroad", Rand April 1983;
1983 and 1983 Rand fatality data from SF Chronicle, 4/22/84

Nuclear-related terrorist incidents also escalated from an average of 1.5 incidents per year in the 1966-76 period to 27 incidents in 1979 alone, 26 in 1980, and 21 in 1981. See table 1, next page.

Table 1

NUCLEAR INCIDENTS ABROAD: 1966-1981

Tactic	Year											Total
	1966	1968	1973	1974	1975	1976	1977	1978	1979	1980	1981	
Bombings					5	2	4	5	10	13	15	54
Diversión, unauthorized use ^a		1			1				1	1		4
Theft	1			1					1	1		4
Sabotage, arson							2	3	4	2		11
Extortion, threats									1			1
Insiders												0
Assaults			1				2	2	2	1	5	13
Intrusion, trespass									2	1		3
Illegal trade								1				1
Miscellaneous thefts					1		3		1			5
Malevolent use ^a				3					2	1		6
Unauthorized disclosure									2	1		3
Disruption of transport ^a									1	3	1	5
Occupation of facilities												0
Standoff attacks												0
Other							1			2		3
Total	1	1	1	4	7	2	12	11	27	26	21	113
No. of fatalities	0	0	0	0	0	0	2	2	1	2	2	10

^aOf nuclear materials.

source: "A Review of Recent Trends in International Terrorism and Nuclear Incidents Abroad", Rand 1983; 1982 data not included because incomplete

One potential threat of nuclear terrorist activity comes from the employees of the facilities. In this country, there have already been numerous attempts at sabotage and demonstrated thefts by employees at nuclear facilities. In 1979, the General Electric plant in Wilmington, North Carolina received an extortion letter demanding \$100,000 in cash, threatening to disperse a container of uranium oxide powder throughout a large, unnamed American city. The letter contained a sample of the UO_2 , and the writer said he possessed two five-gallon containers of it, which he identified by the plant's serial numbers. The General Manager of the plant verified the fact that the containers were missing.³

In another instance, two employees of a Surry, Virginia plant poured sodium hydroxide (lye), a strong corrosive agent, on new fuel assemblies being stored at the plant. Both had authorized access to the storage building.⁴

The insider with access to virtually every area of a nuclear facility could play a potential role in aiding political groups to attain their desired results.

Deteriorating Political Constraints

It is in light of the dramatic increase in terrorist violence and a demonstrated trend toward theft, sabotage of and threats to nuclear facilities, that one should view world political events and evaluate the existing political constraints. In 1981, with the incidence of terrorism then at its highest, the Israeli government bombed and destroyed Iraq's Osirak nuclear research reactor, then under construction. The bombing, marking the first time a nuclear reactor had actually been destroyed, could have a powerful impact on deteriorating political constraints. The attack, the Israelis have stated, was a response to their belief that Iraq would attempt to divert weapons-grade nuclear material and technology from their research reactor for use in making atomic weapons, an event

3 "Potential Threat to Licensed Nuclear Activities from Insiders," NUREG-0703 (Nuclear Regulatory Commission), July, 1980.

4 Ibid.

the Israelis say they could not, in their national interest, permit. There were attempts made to stop the Osirak project prior to the Israeli destruction of the reactor in 1981. These attempts included bombings of facilities in Rome and France, where components for Osirak were being developed, as well as the murder of an Egyptian nuclear scientist who was working as the technical link for the installation and operation of the Osirak reactor. Though denied by Israel, there has been widespread speculation that the destruction of some of the reactor's components was carried out by agents of the Israeli government.⁵

Nine months before Osirak was finally destroyed, Iranian fighter-bombers attacked, but failed to damage the reactor. (During neither air attack was the reactor yet radioactive.) This bombing, as strategy in the conflict between Iran and Iraq, marked the first time a nuclear facility had been targeted during wartime.

The final destruction of the Osirak reactor has set a major historical precedent. A research reactor with highly enriched uranium and believed to be capable of producing plutonium was the target of attack. Research reactors utilizing weapons-grade uranium or producing substantial amounts of plutonium may now become far more likely targets of attack in this era of changing terrorist violence.

Deteriorating Moral Constraints

Just as political constraints are loosening, so too are apparent moral constraints. Though in the past some scholars have thought that terrorist groups would abide by a common set of moral constraints, restricting themselves to high-visibility but low-casualty scenarios, recent events give reason to believe times are changing.

In the past, wanton terrorist killing has provoked general condemnation and has placed some degree of restraint upon groups. The Basque terrorist group, Euzkadi Ta Azkatasunia or ETA, however, has pressed these moral limits. The ETA is one of the most radical

⁵ Rand, 1983, *ibid.*, p. 70-71.

groups active in opposing a nuclear plant, although they do not act for anti-nuclear reasons. The group, a separatist organization for Basque Homeland and Liberty, opposed the construction of two reactors at Lemoniz, because it is part of the Basque region. The group sees the reactors as being forced upon them by an illegitimate government. The group used tactics such as bombings, killings and attacks on powerlines and industries producing components for the reactors. Top plant officials were murdered and the lives of all workers involved in the plant's construction were threatened. These actions succeeded in stopping the construction of the Lemoniz plant.

The particular methods used and their success in achieving their goals is indicative of changing moral constraints on terrorist groups. Although their methods initially elicited great public outrage, the ETA persisted with their activities until public fear and outrage actually aided them in achieving their goals. This may suggest to other terrorist groups that to persist despite public revulsion will earn political success.

Public moral outrage is therefore no longer an effective response to extreme tactics; in fact, this outrage has become a means by which terrorist groups can achieve their goals.

The embassy truck bombings in Beirut have also demonstrated severely reduced moral constraints on terrorists. The truck bombing in October of 1983 which killed more than 250 people at the U.S. Marine Compound represented the largest loss of U.S. military lives since the Vietnam war. Not only is the terrorist tendency now toward killing large numbers of people, but the kamikaze style of these attacks represents heightened furor or a decreased expected rationale on the part of the terrorists. Moral restraints acting on terrorists have been replaced by conviction for a cause, even though their resulting death may net only a symbolic success for their group. One can no longer assume, therefore, that public outrage will in any way deter the terrorist, as these individuals do not even value their own lives.

The suicide truck bombings are especially insidious; the terrorist's willingness to take his/her own life makes protecting against attack extremely difficult. After the October 1983

bombing, the Secretary of Defense, Casper Weinberger admitted, "Nothing can work against a suicide attack like that, anymore than you could do anything about a kamikaze flight diving into a carrier in World War II."⁶

After three truck bombings the U.S. appears helpless to defend itself against new terrorist methods. It was only after each incident in Beirut that the United States realized its gap in safeguards--in the nuclear arena, the magnitude of the damage possible is dramatically increased. Neglecting to assess and upgrade safeguards until after a disaster would be appalling irresponsible.

Evaluating Safeguards--"...a shambles"

If an increasing tendency toward nuclear terrorism is taking place, it is then necessary, and only logical, to evaluate and upgrade the facilities' safeguards as they would be the target or source of future terrorist actions. The facilities must be able to guard against group assaults or insider-aided theft. Security measures at nuclear facilities are infamously insufficient; the facilities often have large quantities of material unaccounted for (MUF) and inexperienced or insufficiently trained security guards. A recent test of security forces at one plant timed security response to a mock attack. The officials responded 16 minutes after the would-be attackers had left with the plutonium. Security alarms and sensors failed to work in other test conditions. Research reactors, particularly those at universities, have vastly less security than the Los Alamos National Laboratory, yet LANL failed three out of three tests conducted.⁷ In two tests the mock terrorists would have been able to make off with plutonium and in the third they would have been able to steal a fully assembled test device (an unlocked nuclear explosive)--a situation which Congressman Dingell termed "a shambles." These tests resulted in the closing of Los Alamos' "S" site because of the inadequate security.

⁶ Time, November 7, 1983

⁷ May 7, 1984, letter, Dingell to DOE Secretary Hodel

Obviously, steps must be taken to secure weapons-grade material at university research reactors which have vastly less security than a national weapons lab such as Los Alamos.

Ineffective Response to Theft

There have been 70 nuclear extortion threats in the U.S., each of which has, because of facilities' large quantities of material unaccounted for, been taken seriously.⁸ The government's nuclear emergency search team, NEST, has been called in on 20 of these threats, and would be the government's major recourse to the theft of HEU.⁹

However, as this country's most organized system of response to a nuclear threat, NEST is most inadequate. NEST basically consists of five helicopters with radiation detectors that are dispatched from heliports in Las Vegas and Andrews Air Force Base in Washington, D.C. to the area of the threat's origin. The helicopters "comb" the area in search of radioactivity, a process which in cities takes days. Granted that NEST has highly trained experts at its fingertips who, through lab analyses of extortion notes, glean information on the mental condition of the writer, and his/her sex, age, and level of education; however, none of this prevents a threat from actually being carried out. Analysts can aid in detection of the threat's veracity, but this will not speed the process of detecting the source of the threat. Depending on the sanity of the individual or the seriousness of a political group's willingness to kill many people and destroy a city, a bomb could be detonated before the helicopters have located it.

There is also some question as to the length of time required for NEST to reach the threat's site from its bases. Though NEST is ready to deploy in two hours, the threat's site may be a great distance from NEST heliports.

8 U.S. News and World Report, February 7, 1983

9 Ibid.

Conclusion

If research reactors continue to use HEU, it is clear that they must be strictly and thoroughly protected against the rising risks of nuclear theft and assault. The existing safeguards at research reactors are not sufficient to prevent theft. Neither is the government's search team, NEST, an effective after-the-fact response. Because many research reactors are at universities, it would be difficult to retain an academic research and teaching environment if security measures were sufficiently increased. Additionally, the cost of the necessary security measures would far outstrip the costs of conversion to non-weapons-grade fuels. Even with such security, the university would remain a likely target because of the continued presence of HEU at the facility.

Conversion to low enriched uranium is the logical option in providing a greater level of security by removing the incentive for theft. Conversion would be less costly than the high level of security needed to guard HEU for the life of the reactor; neither would conversion hinder research in any way, as reactors function as well on LEU. In fact, it would be more conducive to the scientific research atmosphere, being less a terrorist target for theft or destruction.

The chief concern for these facilities must be their safety and security; ignoring political warning signs can only net disaster. The past four years have seen the destruction of a HEU-fueled research reactor in Iraq, and escalated levels of terrorist violence, both nuclear and non-nuclear related, especially directed toward the U.S. We have also witnessed the U.S. as a three-time victim of suicide truck bomb attacks, against which our Secretary of Defense has stated it is impossible to protect. These events would appear to be a mandate to protect our facilities against a terrorist attack. Conversion to LEU is the logical choice, being both far safer and less costly to protect than HEU. The failure to use foresight on this matter could have catastrophic effects.

PR-50
RULE
(44 FR 27769)

94

SOUTHERN CALIFORNIA FEDERATION OF SCIENTISTS

3425 McLaughlin Avenue, Suite 209
Los Angeles, California 90066

64 OCT 29 P1:23

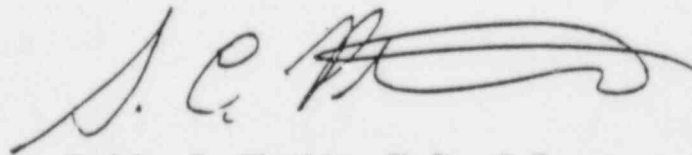
October 25, 1984

Attn: Docketing and Service Branch
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

Enclosed please find the comments of the Southern
California Federation of Scientists concerning the proposed
HEU conversion rule (49 FR 27769).

Sincerely,



Sheldon C. Plotkin, Ph.D., P.E.
Co-Chairperson

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SOUTHERN CALIFORNIA FEDERATION OF SCIENTISTS

3425 McLaughlin Avenue, Suite 209

Los Angeles, California 90066

(213)390-0306

'84 OCT 29 P1:23

Statement of Dr. Sheldon C. Plotkin
Co-Chairperson, Southern California Federation of Scientists

Before the
Subcommittee on Energy Research and Production
and the
Subcommittee on Energy Development and Applications
of the
House Committee on Science and Technology

October 11, 1984

My name is Dr. Sheldon C. Plotkin. I am an engineer by profession, and Co-Chairperson of the Southern California Federation of Scientists, a thirty-five year old organization of scientists and engineers. SCFS has, for the last five years, been deeply involved in issues regarding safety and safeguards at research reactors. We strongly support the proposed NRC rule to require such reactors to convert to the use of non-weapons-grade nuclear fuels. Should the rule be reversed, two serious consequences could result: major obstacles to achieving the U.S. foreign policy goal of converting foreign reactors and thus reducing commerce in weapons-usable materials, and the potential for theft and possible detonation of Highly Enriched Uranium (HEU) that would remain at these domestic sites. Neither consequence is acceptable.

Highly Enriched Uranium as found at some of these research reactors is extremely dangerous in that it can be used directly to fashion a nuclear explosive. The separation of the HEU from the fuel is an elementary matter, and the fuel at most of these low-power reactor is either unirradiated fuel in storage or so lightly irradiated that there is little if any deterrent to its theft. Because many of these reactors are located on university campuses, with the open atmosphere which is such a fundamental aspect of academic life, security is not, and cannot be, anywhere near sufficient to protect weapons-grade material from potential terrorist acquisition.

The proposal to have DOE retrieve the HEU it loaned these institutions and replace it with Low Enriched Uranium (LEU) of little or no proliferation danger if stolen is sensible, admirable, and necessary. The reactors can continue their research, but the nation's security will have been inestimably enhanced. With Congressional funding of the replacement LEU fuel, transportation, and related expenditures, there should be no adverse impact on these reactors whatsoever. In fact, there would be much advantage: reduced risk of terrorist attack, reduced need for expensive and obtrusive security measures, and reduced public concern.

We understand that a few research reactor operators have expressed concern about the conversion proposal, particularly that unique research which requires HEU would be lost if conversion to LEU were required, and that public opposition and legal interventions might occur if license amendments for such conversion were needed. Both concerns seem to be misplaced.

First of all, we understand that the NRC's proposed rule provides a "unique purpose" exemption so that any reactor which could not perform its unique research with LEU would not be required to convert to LEU. The vast majority of reactors could convert without noticing any difference; those very few who might be adversely affected are to be exempted. There is no issue here.

Secondly, as to the concern that there might be public opposition and legal action taken in response to conversion license amendments, it would appear this concern is turned upside down. There have been interventions-- we even assisted in providing technical assistance to one of them-- in reactors with HEU. There, responsible citizens were concerned, correctly we believe, that the security in place was grossly inadequate to protect weapons-grade material from theft or diversion. Intervenorors were pushing for conversion to LEU; had that occurred, many of the issues contested would have been resolved.

It is the presence of HEU which has led to interventions. It is removal of HEU that will protect these institutions against interventions. No group has ever opposed conversion to non-explosive fuel; several have opposed refusals to convert, however. Thus, if institutions wish to ensure public opposition and legal battles, defeat of the NRC rule is the best guarantee. If they wish to avoid these troubles, conversion is the best remedy.

We should also point out that the choice is really conversion or vastly increased security. The latter would be far more expensive, would not be paid for by Congress as will be replacement of the DOE fuels, and would substantially alter the academic environment of the affected sites. Failure to convert thus is likely to lead to closure of a number of reactors whose institutions cannot afford the very expensive task of seriously upgrading security to adequately protect weapons-grade materials, or whose Engineering Deans do not want the trouble involved with creating a high-security area with all the attendant problems in the midst of an open campus.

We have no intention of assisting any group in opposing conversion to LEU. We would, however, give serious consideration to a request for technical assistance in an NRC proceeding were the conversion rule overturned and HEU remained at research reactors. If reactor operators wish to avoid the

problems UCLA was faced with, conversion would help; refusal to convert would increase, not decrease, the likelihood of public outcry and legal challenge. It is the presence of weapons-grade material that is causing so much of the public concern about these reactors in the first place.

It is instructive to remember that UCLA removed its application for license renewal one week before security hearings were to open in that proceeding, assessing the adequacy of security at the site in light of the very sensitive material possessed. UCLA could not meet its burden in demonstrating adequate security, and it has withdrawn its application. Had it converted to LEU, all of its difficult security problems would have vanished.

In conclusion, conversion is in the interests of reactor operators. Without conversion, they face continued and growing public opposition, vastly increased security requirements, and the prospect that a number of such facilities will shut down because they can't afford the additional security or because of the public concern generated by the presence of weapons-grade materials in underdefended locations. Without conversion domestically, our initiative to convert foreign reactors and reduce international commerce in HEU is doomed to failure. And perhaps

most importantly, without conversion, we face the unacceptable risk that someday some group will steal weapons materials from these reactors, fabricate an atomic weapon, and threaten to, or actually proceed to explode such a destructive device, with the extraordinary results to international order that would flow therefrom, not to speak of the immense human suffering caused. The NRC proposal to replace the HEU at these reactors with non-weapons-grade materials is a cheap, prudent, and very sensible proposal, one which deserves widespread support.

UNIVERSITY OF SOUTHERN CALIFORNIA
UNIVERSITY PARK
LOS ANGELES, CALIFORNIA 90089-1062

DEPARTMENT OF CHEMISTRY
(213) 743-2780

JOINT NUMBER PR-50
PROPOSED RULE
(49 FR 27769)

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RECEIVED
OCT 26 1984
Docketing and Service Branch
Office of the Secretary
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

October 26, 1984

Dear Sir:

Please consider my enclosed statement concerning the use of
HEU in research/training reactors.

Sincerely,

James C. Warf

James C. Warf
Professor of Chemistry

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Statement of Dr. James C. Warf

Submitted to the Subcommittees on
Energy Research and Production
and on
Energy Development and Applications
of the
House Committee on Science and Technology
October 12, 1984

I am Professor of Chemistry, Emeritus, at the University of Southern California (USC), where I have been a member of the faculty for the last thirty-six years. Prior to that time, I spent five years with the Manhattan Project, mostly at Ames, Iowa, and to a lesser extent at the University of Chicago and at Oak Ridge, Tennessee. I specialized in the chemistry of nuclear materials and was Group Leader of the Analytical Section and, part of the time, the Inorganic Section. A more detailed statement of my professional background is attached.

I strongly support efforts to replace Highly Enriched Uranium (HEU) with Low Enriched Uranium (LEU) at research and test reactors, both in this country and abroad. HEU is weapons-usable material, and thus poses a significant risk if stolen or diverted. Removing HEU from these reactor sites and replacing it with LEU is a very prudent step, which I vigorously endorse.

If the fuel found at these reactor facilities were stolen or diverted, the weapons-grade uranium contained therein would be readily removable. This is true whether the fuel is in the form of uranium-aluminum plates or uranium-erbium-zirconium-hydride rods.

Uranium and aluminum can be separated chemically from their alloy by any number of techniques. One method is to dissolve the eutectic in hydrochloric acid, and oxidize the uranium to uranyl ion using nitric acid. Addition of excess sodium hydroxide precipitates the uranium as sodium diuranate, but converts the aluminum to the soluble aluminate ion. Separation is effected by centrifuging. Alternatively, the uranyl nitrate can be extracted by ether or butyl phosphate, leaving the aluminum in the aqueous phase. These are not difficult procedures, particularly for someone intent on acquiring an atomic explosive; one might say, in fact, that they are not beyond the ability of most students in introductory chemistry classes at the college level.

Highly enriched uranium contained in uranium-erbium-zirconium-hydride fuels is likewise readily separable by modified procedures. These are not particularly difficult tasks chemically.

If the fuel stolen were fresh (i.e., unirradiated) fuel, practically no precautions would need to be taken by the thieves

to deal with radioactivity. If the fuels are only lightly radioactive, due to low power of operation or low frequency of use of many of these small research reactors, there would likewise be only a small barrier to removal and separation of weapons-usable material from such fuels if successfully stolen. For those few, high power research reactors with somewhat higher radiation levels for their fuel in-core, the highly enriched uranium could still be removed and chemically separated if the thieves took appropriate precautions. Precautions such as constantly maintaining high surface-to-volume ratios to avoid self-sustaining nuclear reaction would have to be observed in all cases.

Anyone who worked, as I did, on the Manhattan Project, and knows the extraordinary destructive power associated with highly enriched uranium when detonated, has great respect for such material. It should not be found where not needed; if low enriched fuels are available, HEU fuels should be replaced with the far safer LEU fuels.

Converting to low enriched fuels-- i.e., ones which, if stolen, cannot be made directly into a clandestine explosive-- is a very sensible policy, one which should be energetically followed.

JAMES C. WARF

Professional Vita

1939 B. S. degree in chemistry, University of Tulsa
1940 Phillips Petroleum Co.
1941-42 Instructor in Chemistry, University of Tulsa
1942-47 Group Leader, Manhattan Project (development of nuclear energy), Iowa State University (Ames), University of Chicago, Oak Ridge
1946 Ph. D. degree in inorganic chemistry, Iowa State University
1947-48 Guggenheim Fellow, University of Berne, Switzerland
1948 to the present, Assistant Professor, Associate Professor, Full Professor of Chemistry, University of Southern California, Los Angeles

Chemical education in Southeast Asia

1957-59 Visiting Professor, University of Indonesia, Jakarta
1962-64 Visiting Professor, Airlangga University, Surabaya, Indonesia
1974-75 Visiting Professor, National University of Malaysia, Kuala Lumpur
1976 Visiting Professor, National University of Malaysia, Sabah (formerly British North Borneo)
1978 Visiting Professor, Hasanuddin University, Ujung Pandang, Celebes, Indonesia
1979 Visiting Professor, Andalas University, Padang, Sumatra, Indonesia
1982-83 Visiting Professor, National University of Malaysia, Kota Kinabalu, Sabah, Malaysia

1969-70 Sabbatical leave, Visiting Professor, Technical University of Vienna, Austria

1965-74 Summer consultant, Jet Propulsion Laboratory, Pasadena, California

1945 Founding member, Federation of American Scientists

Research Fields: Rare earth and actinide hydrides and deuterides, carbides, copper hydride, crystallography, thermodynamics, kinetics, liquid ammonia chemistry of rare earth elements, electrochemistry in nonaqueous solvents, carbon-14 studies, analytical chemistry.

Publications: 65 chemistry papers in journals, 10 books (6 in Indonesian or Malaysian languages)

Travel and seminar presentation at universities in most of western Europe, Japan, Hong Kong, Singapore, Indonesia, Malaysia, Thailand, Vietnam, Cambodia, India, Soviet Union, Poland, East Germany, Austria, Czechoslovakia, Hungary, Yugoslavia, Iran, Turkey, Australia, New Zealand, Fiji Islands, Tahiti, China

DD-50 (49 FR 27769) 46

414 Rose Avenue--Box 147
Aromas, CA USA 95004
10 September, 1984
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RECEIVED
Secretary to the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Section
Regarding: Proposed Rule to Reduce Use of Highly Enriched Uranium (49 FR 27769)

To the Commission:

I understand that the Nuclear Regulatory Commission is considering a proposal to require university research reactors to convert to non-weapons-grade fuel. I applaud the proposed rule and urge that it be rapidly and strictly implemented. The risks of nuclear weapons proliferation and nuclear terrorism are so grave, no delays or exceptions should be permitted.

The purpose of the rule is two-fold: to reduce the risk of weapons-grade material being stolen from largely unprotected U.S. campuses, and to make possible our foreign policy goal of reducing or eliminating the use of Highly Enriched Uranium abroad. If we fail to convert, or delay conversion by a decade or more, as some propose, we undercut both goals. The longer bomb material remains on campus, the greater the risk of theft or diversion, and the more vulnerable these campus reactors are as serious security risks. If the U.S. is perceived as dragging its feet in this matter, then foreign nations--where security is even less strict than it is here--will delay as well.

I have heard that the primary objections to this regulation are economic. These arguments seem to me to be fatuous. The \$14 million cost of conversion--the figure being bandied about--is peanuts compared to what it would cost if terrorists or others somehow got hold of bomb-grade fuel. As you well know, several popular publications have printed directions for bomb manufacture. The only hope of preventing a disaster is to keep enriched fuel out of the hands of those who might misuse it. Were the universities required to adequately protect this material, the financial costs would be far greater than those being considered for conversion. And such security measures would be inconsistent with the atmosphere of universities.

I understand, moreover, that Congress has already appropriated \$2 million for the coming fiscal year to start the conversion process. There is apparently a strong commitment to providing the remaining funds over the next few years as the conversions take place. Even if a few marginal reactors chose to shut down rather than convert, the loss of such marginal programs or the cost to a facility of contributing to the conversion pales in comparison to the costs and risks associated with weapons-grade materials.

Conversion is essential; it must be mandatory, with no exceptions whatsoever. Implementation schedules can and should be rapid. Operating schedules of reactors, cask availability and the like should have little or no ability to delay conversion. While it might make sense to schedule conversions geographically--so as not to require casks to be shipped to the West Coast for one conversion, then the East Coast for another, then back to the

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West, and so on--this should speed up conversion, not delay it.

This said, two parts of the proposed regulation worry me.

First (ref: para. D-2), licensees are given one year to come up with a letter telling the NRC how long it plans to take to carry out the conversion. This is absurd for such an important matter, and threatens to gut the rule entirely. What with extensions, outlandishly delayed schedules, and so on--tactics typical of reactor operators, from what I have observed--this project could take ten years to carry out. That may be far too late.


Second (ref: Fed. Reg. 7/6/84 p 27770 col 3), the proposal threatens to eliminate the public's review of the conversion process. If there is no diminution in safety margins by conversion--and my understanding is that this is the case with all these conversions--then there should be no problem. If there is a diminution in safety margins, however, the public's right to raise its concerns should be maintained. In this regard, the rule that if the licensee can show conversion will fall within "envelopes" of safety margin (to be established by the NRC) no review is required, is inadequate. The standard should be that conversion should not reduce existing safety margins. This seems to me both straightforward and easy to enforce.

(I am particularly concerned that reactor operators might attempt to raise power levels or reactivity limits at the same time they convert, in order to shield these changes from public inquiry. This should not be permitted.)

In summary, I support mandatory conversion of research reactors to non-weapons-grade fuel. This requirement should be without exceptions or loopholes, and implementation should be expeditious. I would suggest, in fact, that conversion be completed within 18 months from the time the appropriate fuel for the reactor becomes available. Most U.S. reactors under NRC jurisdiction should be converted to low-enriched uranium by 1990, with only a few still to be converted during the next couple of years thereafter.

No delays, no exceptions, no loopholes--the risks of theft or diversion of weapons-grade uranium are too great, and our interest in eliminating HEU use abroad too profound, for anything less to be required.

Sincerely,


James Spickard, PhD.



DOCKET NUMBER
PROPOSED RULE PR-50
(49 FR 27769)

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10/11/84

NUCLEAR CONTROL INSTITUTE

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1000 Connecticut Avenue, N.W., Suite 406, Washington, D.C. 20036 (202) 822-8444

October 25, 1984

Secretary of the Commission
United States Nuclear Regulatory Commission
Washington, D.C. 20555

ATTN: Docketing and Service Branch

Notice of Proposed Rulemaking:
Limiting the Use of Highly Enriched Uranium
in Domestic Research and Test Reactors
(10 CFR Part 50)

Dear Sir:

We are writing to express the views of Nuclear Control Institute on the Commission's proposed rule, "Limiting the Use of Highly Enriched Uranium in Domestic and Research Test Reactors," 10 CFR Part 50, published in the Federal Register on July 6, 1984 (49 Fed. Reg. 27769).

We commend the Commission for proposing the rule and concur with the Commission in recognizing the "significance of the proposed rule to the national interest." At the same time, for the purpose of serving that interest more effectively, the Institute has specific recommendations for strengthening the rule to expedite conversion of licensed research reactors from highly enriched to low-enriched uranium fuels and to grant exceptions only in cases in which any benefits clearly would outweigh the risks associated with the fact, as stated in the rule, that "HEU, in appropriate form and quantity, can be used to make an explosive device which can have severe adverse consequences on public health, safety and the environment."

Conversion Schedule

We are concerned that the conversion schedule to which the operators would have to adhere is not, in the current language of the proposed rule, developed in a manner that will promote speedy

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Administrated by 11/1/84

PRESIDENT
Paul L. Leventhal

BOARD OF DIRECTORS

Peter A. Bradford, David Cohen, Rear Admiral Thomas D. Davies, USN (Ret), Denis A. Hayes, Julian Koenig, Paul L. Leventhal, Sharon Toner Leventhal, Dr. Theodore T. Taylor, Barbara W. Tuchman

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compliance. Section 50.64(d)(2) states, "The proposed schedule shall be based upon availability of shipping casks, financial support, and reactor usage. A final schedule will then be determined by the Director of the Office of Nuclear Reactor Regulation."

The Institute recommends that the Commission establish a two-year deadline to complete conversion, subject to exceptions granted only under extraordinary conditions. Operators should be required to submit proposed schedules within six months of the effective date of the rule, not 12 months as currently provided. A decision on scheduling should be made by the Commission within 12 months of the effective date of the rule with the objective of completing conversion within the following 12 months.

With regard to factors affecting the conversion schedule, we believe "reactor usage" should not be among them. Several of the reactors subject to the rule are underutilized and consume fuel at such a slow rate that it would be years before they would be required to convert if all present fuel had to be exhausted first. Further, the smaller reactors have a lifetime supply of HEU on hand and would never be required to convert to LEU if consumption of existing fuel were the determining factor.

Nor do we believe "availability of shipping casks" should be a factor in delaying conversion. Since conversion requires the use of casks for only a few days, the Commission, with cooperation from the Energy Department, should be able to coordinate the conversion effort to avoid completely the problem of supplying the necessary casks. (The question of "financial support" as a factor is addressed below.)

The "availability of replacement fuel," in our view, is the only factor that should be considered in developing schedules for conversion to LEU. As the Commission itself notes in the introduction to the proposed rule, "conversion of several non-power reactors from HEU fuel to LEU fuel is technically feasible and, if the goals of the RERTR [Reduced Enrichment for Research and Test Reactors] program are successfully achieved over the next five years, will be technically feasible for almost all the remaining reactors." We agree with this finding and recommend that conversion schedules should be extended beyond two years from the effective date of the rule only for those few reactors for which fuel will not be available within that period.

Unique-Purpose Exception

Sections 50.46(d)(1) and (2) should be amended to require that a request for an exemption from conversion on the grounds of the reactor's unique purpose be submitted within six months of the effective date, as already stipulated, but together with a proposed schedule in the event that the request is not approved. In this way, the Commission would still be able to approve a conversion schedule within the 12-month period recommended above for those reactor operators whose requests for an exception are

denied.

Further, we recommend that the decision to grant exceptions should not be left to the sole discretion of the Director of the Office of Nuclear Reactor Regulation. Because of the vital national-security interests at stake in this issue--- both with regard to eliminating bomb-grade nuclear material from campuses and to setting an example for foreign operators--- exceptions should be granted only by a vote of the Commission, and only in cases of legitimate countervailing national interest.

Further, the Commission should strike Section 50.64(b)(3)(i), which would allow a unique-purpose exemption on the basis of "[a] specific experiment or program." The Commission should not grant such exemptions unless the "preponderance" of work done at the reactor requires HEU.

In the event the Commission grants an exemption that permits a delay of or exclusion from the rule, the Commission should require that (1) security at the reactor be substantially upgraded to ensure protection of the HEU on site and (2) that the licensee be required to absorb the full cost of the upgrade. Similarly, if the Commission decides to downgrade the proposed rule to permit more reactors to continue using HEU than would be the case under present provisions, such licensees should be required to upgrade security at their own expense.

In our view, it is unthinkable to keep weapons-grade uranium in reactors with the lax security as now exists at some sites (see the January 27 testimony of Daniel Hirsch, Committee to Bridge the Gap); if licensees are not required to convert to LEU they must lower to acceptable levels the danger that the HEU presents by improving the security around it. We believe that existing NRC standards for security at licensed non-power reactors, which require only detection, rather than prevention, of unauthorized entry, need to be upgraded substantially for any such facilities that continue to use HEU.

Financial Considerations

The economics of conversion are such that conversion to LEU can be implemented without delay at those sites for which fuel is available. Congress this year appropriated \$2 million for this project, a sum representing as much as 40%---and at least 15%---of total conversion costs. In light of this development, and the historical record noted by the Commission of federal support for such undertakings, there is every reason to expect that the conversion will be fully funded by the federal government.

Operator objections on the basis of cost are, therefore, unfounded, especially, as the Commission correctly notes, "Any economic analysis should include estimates of the aversion of risk to public health, safety and the environment." It bears repeating in this context that security measures undertaken in the place of conversion should not be federally funded. Such costs are likely

to exceed substantially the costs of conversion.

The Commission raises the legitimate question of whether "the economics of conversion should influence Commission actions." We believe that economics should not influence the Commission's actions. Given the national and international security interests at stake, the costs of conversion would certainly be a small price to pay, even if one uses the cost estimates of the most pessimistic analyses provided by the operators.

Relicensing

A related and equally unfounded objection is that conversion would involve a relicensing procedure which would allow public-interest groups to intervene and attempt to shut the reactors down. In our view, the Commission has included provisions to keep to an absolute minimum the possibility that conversion of non-power reactors would require relicensing. Even in cases in which relicensing were necessary---and it would be only an amendment to an existing license rather than a complete relicensing---the public-interest groups of concern to the operators would have no reason to intervene since they strongly support the proposed conversion and, in fact, will do whatever they can to expedite the process. On the other hand, public-interest groups can be expected to seek a substantial upgrading of security at reactors that are not required to convert and the shutdown of those where security is not upgraded satisfactorily.

Technical Implications

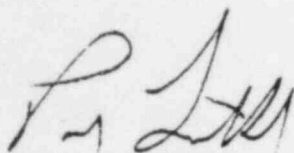
Critics of the rule have also raised questions about the technical implications of the conversion. Some opponents of the rule have claimed that the changeover would adversely affect reactors' research capabilities. However, as Dr. Theodore Taylor of our Board of Directors made plain in his testimony before the Commission on January 27, the universities already have restricted themselves by limiting the power of their reactors. If they want to compensate for the loss in neutron flux caused by the conversion, he pointed out, they can increase the power level of the reactors.

International Implications

Another objection raised is that any positive impact of the conversion---that is, removing HEU from circulation and thereby encouraging foreign governments to take similar steps---is minimized because the HEU in question at licensed facilities represents only about 15% of the total in U.S. reactors. This argument also misses some of the fundamental points of the Commission's rule. First, foreign governments have expressed a willingness to support the RERTR program but, understandably, would like to see the U.S. impose such restraints upon itself before expecting other countries to do so. And, although the HEU in question does represent only a small fraction of the U.S. total, the proposed rule represents the first tangible commitment

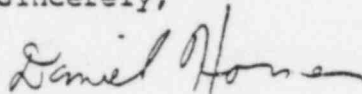
by the U.S. to get its own house in order. Once the proposed NRC rule takes effect, efforts can be made to have the Energy Department, which controls the remaining HEU, consider the conversion of its test reactors. In the meantime, HEU will have been removed from low-security environments such as college campuses. This removal would represent a significant step in increasing international security, for it would eliminate an extremely inviting and vulnerable target for terrorists.

In conclusion, the Institute strongly supports the Commission's proposed rule with the changes recommended above. The rule provides a means by which the national interest can be served with the most minimal expenditure and inconvenience to the parties involved.



Paul Leventhal
President

Sincerely,



Daniel Horner
Issues Director

Associated Students of the University of California

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SANTA BARRARA • SAN DIEGO

DOCKET NUMBER PR-50
PROPOSED RULE
(49, R 27769)

105

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STUDENT BODY PRESIDENTS' COUNCIL

926 J St. Room 522
Sacramento, Ca. 95814

October 29, 1984

Att: Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

11/1/84

Re: HEU Conversion Rule (49 Federal Register 27769)

Dear Sir:

On September 25, 1984 the Energy Development and Applications Subcommittee and the Energy Research and Production Subcommittee of the House Committee on Science and Technology held a public hearing on the NRC's proposed rule to require conversion of all nuclear research reactors from highly enriched uranium to low enriched uranium. The University of California Student Body President's Council, which represents the 141,000 students of the nine-campus University of California system, has expressed strong support of the proposed requirement of conversion to the NRC. The students of the University of California were appalled at the undemocratic public hearing held by these two Congressional subcommittees. For the oral testimony only those organizations and individuals, who were opposed to the rule, were allowed to testify. Even upon request, supporters of the rule were denied permission to speak.

The chairpeople of the two subcommittees may submit a recommendation to the NRC on the proposed conversion rule based on their hearing. It is our belief that these subcommittee chairpeople are not prepared to make a sufficiently informed recommendation to the NRC based on the one sided presentations.

I have enclosed a copy of the written testimony which the Student Body President's Council submitted to the two subcommittees. As student leaders, we do not believe weapons-grade uranium belongs on university campuses, where it can not be adequately protected from theft. Considering the budgetary constraints facing universities today, we do not believe educational money should be used to provide the expensive security or to fight expensive and lengthy litigation over continued presence of HEU, which will certainly follow if the NRC does not require the removal of this bomb-grade uranium from research reactors.

The idea of exemption for any of the HEU research reactors seems to contradict the purpose of the rule which is to decrease the unnecessarily large quantity of sensitive nuclear material,

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which exist in the United States. The failure to require conversion of domestic research reactors and Department of Energy reactors would result in the refusal of foreign reactor operators to convert from weapons-grade uranium. The NRC has a possibility to make a decisive commitment to the reduction of nuclear proliferation. Any exemptions regardless of reasons such as uniqueness of purpose or the lifetime of the reactor's core will not be well received on university campuses throughout the country.

As the NRC may be aware, the students of American universities believe very strongly in the necessity to reduce nuclear proliferation. The Student Body President's Council has been in communication with student governments across the nation, who would be affected by a rule requiring conversion. If the NRC does not support a comprehensive, national regulation requiring conversion, we will encourage other student governments to work with their university's board of trustees and their state legislatures to require the conversion of the dangerous nuclear reactors within their state.

Thank you for your careful consideration and support of this important decision.

Sincerely,

Kevin Gillis

Kevin Gillis

Chair

Social Responsibility Committee

U.C. Student Body President's

Council

enclosed: cover letter to House Committee on Science and Technology subcommittees; testimony to the subcommittees and a resolution by the University of California Student Body President's Council supporting the proposed regulation requiring conversion from HEU to LEU.

Associated Students of the University of California

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SANTA BARBARA • SAN DIEGO

'84 NOV -1



STUDENT BODY PRESIDENTS' COUNCIL

Representative Don Fuqua
Chairman
Subcommittee on Energy Development
and Applications
Committee on Science and Technology
U.S. House of Representatives
Washington, D.C. 20515

Representative Marilyn Lloyd
Chairman
Subcommittee on Energy Research and
Production
Committee on Science and Technology
U.S. House of Representatives
Washington, D.C. 20515

Dear Representatives Fuqua and Lloyd:

The University of California's Student Body Presidents' Council, which represents the 141,000 students of the nine-campus University of California system, is appalled that your two subcommittees would conduct such an undemocratic public hearing as you did on September 25, 1984. Your two subcommittees held on that date a joint public hearing to consider the proposed regulation by the Nuclear Regulatory Commission on the Conversion of all research reactors which presently use highly enriched uranium (HEU) to the use of low enriched uranium (LEU). HEU is weapons-grade uranium and can with only slight modification and minimal technological expertise be used to build a nuclear bomb. LEU, with under 20% enrichment, cannot be readily used in the construction of a nuclear weapon. The Student Body Presidents' Council has unanimously endorsed the rule proposed by the NRC to require immediate and complete conversion. See the attached resolution.

SBPC has registered our official support for the conversion rule with the NRC. We were therefore outraged that your two subcommittees held a public hearing on the rule and allowed only public opponents of the rule such as nuclear reactor operators to present oral testimony. After reading their testimony, it does not seem possible for your two subcommittees to make a sufficiently informed recommendation to the NRC on the conversion rule, since you have heard only one side of that complex issue.

We are informed by your staff that, although we would not be permitted to provide oral testimony, we could submit written testimony after the hearing, which is attached. We request that you include this letter and the attached written statement and resolution in the official hearing record. We hope that in the future your subcommittees will be more conscious of including all points of view in your oral public hearings.

Sincerely,

Kevin Gillis

Kevin Gillis

Chair Social Responsibility Committee

Associated Students of the University of California

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STUDENT BODY PRESIDENTS' COUNCIL

STATEMENT OF

KEVIN GILLIS
STUDENT BODY PRESIDENTS' COUNCIL
UNIVERSITY OF CALIFORNIA

BEFORE THE

COMMITTEE ON SCIENCE AND TECHNOLOGY
ENERGY DEVELOPMENT AND APPLICATIONS SUBCOMMITTEE
AND
ENERGY RESEARCH AND PRODUCTION SUBCOMMITTEE
U.S. HOUSE OF REPRESENTATIVES

October 10, 1984

My name is Kevin Gillis. I am the Chair of the Social Responsibility Committee of the University of California Student Body Presidents' Council, which represents the 141,000 students of the nine-campus University of California system. SBPC, because of its concern about the security and proliferation risks associated with the presence of weapons-grade uranium at university campuses, has unanimously endorsed the NRC proposal to replace highly enriched uranium (HEU) at these research reactors with low enriched uranium (LEU) from which atomic weapons could not be made if the material were stolen. We believe this is a very important positive step, and any attempt to reverse the proposed conversion of these reactors could have very serious results.

The potential security threat involved with having weapons-grade nuclear materials on university campuses is grave. As students who live and work on university campuses, we know that this highly sensitive material cannot be adequately protected by the small, untrained security "forces" on such campuses. The security which does exist at these facilities is often more extensive than the security found at the campus bookstore. Unlike nuclear power reactors,

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which are located in sparsely populated areas with extensive security, such as large exclusion zones, security perimeters and containment structures, these nuclear research reactors are located on densely populated college campuses, often surrounded by large urban centers. Reactors sit on these campuses without any security of the security precautions found associated with power reactors. Students and visitors move freely around the normal classroom buildings in which the reactors are housed. Since the reactors are used for instruction and students on work-study are employed in the reactor facilities, any registered student can gain access and even possession of the keys to the facilities in which weapon-grade uranium is stored. As students ourselves, know that these student employees do not always realize or understand the sensitivity of the material with which they are working.

This low level security is unacceptable for material which, if stolen, could result in a major national or international crisis. This lax security must be improved if HEU is to remain on college campuses. However, the cost of improving security to an adequate level could be far too expensive for the Universities. It appears as if the reactor operators have claimed that conversion is too expensive and if required to convert, they will have to close down their facilities. However, considering the cost of technological alarms and security systems, and the employment of armed guards at the site, the cost of providing sufficient security could well be far more expensive than the actual conversion to non-weapon grade material, which is the most comprehensive security fix. The Department of Energy has agreed to help with the cost of conversion. No government agency will subsidize security. Therefore,

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it simply makes no sense to channel funding from educational programs to expensive security, considering its already tight budget.

Many of the operators have argued against the conversion rule and have said that no terrorist attacks have as of yet been reported against the research reactors. However, no one can deny that terrorism is an unfortunate reality in our modern world. In the past no bombs ever exploded at American embassies or at our nations capitol. However, today this type of terrorism occurs and we students do not want the terrorist target to remain on our college campuses in the future. Must we await a successful theft of HEU from a campus before action is taken. As Turinsky indicated in his testimony to your subcommittees, there has been a rapid decline in student enrollment in the nuclear engineering programs nationwide. For instance, in the University of California system, there are four nuclear research reactors; two of which are fueled by HEU, UCLA and UCSanta Barbara. A systemwide engineering review committee in 1982 reported that the four nuclear engineering departments should be consolidated due to the very low student enrollment. There can be no justification for continuing to permit weapons grade uranium to remain in use at reactors which have such diminished educational benefit when replacement fuel is available. The topic before these two subcommittees is the proposed rule of conversion from HEU to LEU fuel. The only academic question is whether such a conversion will interfere with the research potential of the reactors. According to our investigations with our faculty, the research potential will not be hampered to any significant degree. Very few experiments would have to be altered in the least and those exceptions would

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be altered only slightly. The important consideration is the actual health and safety problems passed by the HEU.

The dangers of having weapons grade uranium on college campuses is being seen by both campus student organizations and governments and community citizen organizations. Their combined public outcry has helped promote the NRC to propose the HEU conversion rule. Some of the individuals who have testified before the subcommittees orally said that public interventions will follow the passage of the HEU conversion rule, by the exact organizations who have supported its conception. This is a completely false representation of the students position. There has never been public action against action which was intended to improve the safety of nuclear reactors, which this conversion rule is clearly an example. There have been several interventions when public safety was endangered. The Universities need not fear intervention if they comply with the HEU conversion. However, there will almost assuredly be a rash of interventions and lengthy litigation if the NRC does not pass this regulation and if individual universities do not comply in removing weapons materials from campuses.

Again the students of the University of California which has two HEU fueled reactors are appalled at the dangerous and negligent security at these sensitive facilities. Due to the cost of improving security the universities should take steps to decrease the potentiality of a terrorist theft by converting to non-weapons grade uranium. This conversion will not effect the academic potential of the education and the research at these facilities. Lastly, the universities need not fear intervention or litigation if they improve the safety of the reactors by conversion. However, inter-

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vention and litigation of public opposition is sure to follow if the reactors do not convert. The presence of weapons-grade uranium at open universities would be a continuing source of public controversy and concern, as well as a major security risk, that can best be alleviated by the proposed NRC rule. Were weapons-grade uranium ever stolen from a university reactor, the consequences could be devastating. Conversion to non-bomb grade fuel is the best protection available against that catastrophic potentiality.

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RESOLUTION

Supporting the Proposed Rule by the Nuclear Regulatory Commission on Limiting the Use of Highly Enriched Uranium in Domestic Research and Test Reactors

WHEREAS, 31 non-power nuclear reactors are licensed in the United States to use highly enriched uranium (HEU)- 25 are owned by universities including one at UCLA and one at UC Santa Barbara, 5 are owned by private corporations and 1 is owned by the U.S. government; and

WHEREAS, highly enriched uranium can be used without further significant processing and without extensive expertise to build nuclear weapons; and

WHEREAS, the security level at these facilities especially at those on university campuses are not sufficient to even moderately protect from a threat of theft; and

WHEREAS, the threat of terrorism is rapidly escalating world-wide and HEU could sell for over \$100,000 per kilogram on the black market; and

WHEREAS, the United States government has spoken out around the world for the reduction of HEU, while at the same time the U.S. exports about 600 kilograms annually (the most in the world) and has not made an effort to limit the almost 500 kilograms of HEU within the U.S.; and

WHEREAS, the reduction of HEU within the U.S. may provide an example and incentive for other nations to emulate thus reducing the danger of international terrorism; and

WHEREAS, the low enriched uranium (LEU) fuels can be used without significant reduction in performance or research potential; now, therefore, be it

RESOLVED, that the Student Body Presidents' Council supports immediate conversion from HEU to LEU internationally and especially within the United States and that the rule must allow no exemptions if it is to accomplish its goal of enhancing national and international security.

8/18/84
KJG



OHIO PUBLIC INTEREST RESEARCH GROUP

BOX 25 · WILDER HALL · OBERLIN, OHIO 44074 [216] 775-8137

OTHER OFFICES: COLUMBUS, WITTENBERG UNIVERSITY,
UNIVERSITY OF DAYTON, WILMINGTON COLLEGE, CAPITAL UNIVERSITY

October 29, 1984

Secretary of the Commission
Nuclear Regulatory Commission
Washington, D.C. 20555
Docketing & Service Branch

DOCKETING & SERVICE
BRANCH

DOCKET NUMBER
PROPOSED RULE PR-50
(49 FR 27769)

107

Re: HEU Conversion Rule (49 Federal Register 27769)

Dear Sir,

As the co-director of OhioPIRG, a statewide organization concerned with energy, consumer, and environmental issues, I am writing on behalf of the organization and our members to urge the conversion of all nuclear reactors which use highly enriched uranium.

Currently, 25 universities, five corporations, and one government agency run non-power reactors with the high-enriched fuel, which is actually weapons-grade material. Why should we allow the constant risk of the theft of this fuel that can be made into atomic bombs by terrorist groups? It is in the interests of U.S. and world security to convert each and every one of these reactors now (not five or ten years from now) to low-enriched uranium.

The low-enriched (LEU) safer fuel is available now, and the reactor at the University of Maryland already has undergone a successful conversion, as well as many other reactors across the country.

The operators of these reactors will not convert without an NRC requirement to do so, and unless all HEU reactors are converted, the theft of weapons-grade fuel will remain a nightmare reality.

OhioPIRG urges the enactment of the proposed conversion rule immediately. It will serve as a signal to the rest of the world that the United States is serious about the problem of nuclear weapons proliferation, and it will mean a great step forward in protecting our national security.

Thank you for your consideration.

Sincerely,

Dan Jaffee
OPIRG Co-Director

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PROPOSED RULE

R-50
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PUBLIC

Educators for Social Responsibility
University Division
Northern California Section
441 High Street
Santa Cruz, CA 95060

October 29, 1984

Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
attention: Docketing & Service Section
RE: HEU Conversion Rule

Dear Secretary:

On behalf of Educators for Social Responsibility, University Division, Northern California Section, I write in support of a strong, mandatory, expedited rule to convert research reactors from weapons-grade uranium.

Nuclear proliferation is one of the gravest problems facing this world. Rarely are there technical solutions to these intractable problems. Conversion of reactors to low enriched uranium is one of those few technical solutions.

We are educators concerned about nuclear proliferation. We do not like the idea that bomb-grade uranium is present in kilogram quantities at a number of universities around this country.

We know university environments well. To provide the level of security necessary to adequately protect bomb-grade materials would unacceptably alter the historically open environment of university campuses, as well as being ruinously expensive in an era in which many educational institutions are hurting for funds. If there is no conversion, strict security improvements would be necessary (not merely a few paper changes); we think many universities would choose to shut their reactors down rather than face the cost and intrusion of strict security of the sort weapons-grade material should entail.

Therefore the conversion proposal is, from the point of view of educators concerned with proliferation, very sensible. We understand the government is likely to pay for the conversion and that reactor performance is essentially unaltered. For those couple of reactors for which there might be a real problem with unique research an exemption (which must be narrow and not abused) would be provided. It is essential, however, that the vast majority of these reactors convert, and convert quickly.

The consequences of theft of weapons-grade uranium from an open university campus could be devastating. The panic that could result from terrorist threat, let alone the possible explosion of a device so obtained, would produce unacceptable consequences.

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Universities have already become focuses of controversy and protest because of presence of weapons-grade uranium at campus reactors. The best way to prevent further controversy over these reactors is to remove the HEU and replace it with LEU. The alternative is to run an unacceptable risk of terrorist theft of nuclear bomb materials--there is no logical reason to not remove weapons-grade materials from campuses when the replacement fuels become available--and to do so for essentially all reactors, with no or extremely strict exemptions, and an expedited schedule.

Sincerely,

Sigrid McLaughlin

Sigrid McLaughlin, Ph.D.

DD-50
(49 FR 27769)

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November 17, 1984

RECEIVED

Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

NOV 21 4:12

Attention: Docketing and Service Branch

Dear Sir:

I am writing to support the NRC proposed rule to require the conversion of NRC-licensed non-power reactors from highly enriched uranium (HEU) to low enriched uranium (LEU) fuels.

I commend the Commission for proposing the rule and agree with its objective to reduce the amount of HEU in circulation within the United States and to encourage foreign non-power reactor owners to do the same in their own countries.

I have attached Congressional testimony I recently wrote in support of the proposed rule that lists several benefits to be gained by implementing it. One additional comment involves an exception to the proposed rule which would allow non-power reactors to use HEU if the facilities unique purpose cannot be accomplished without the use of HEU. -I am concerned that the exemptions could become routine. In order to avoid this possibility, the NRC should show how unique the purposes might be by requiring open hearings.

Converting research reactors from HEU to LEU fuel even in the best of circumstances will take several years. Consequently, the Commission should complement the proposed rule with a policy that will reduce the inventories of non-self protecting HEU at non-power reactors. At present NRC-licensed non-power reactors do not appear to be a likely target of terrorist groups. But, it is clear from past acts by international terrorist groups, as Commissioner Bernthal noted recently in Congressional testimony, "that a threat can materialize without sufficient warning from intelligence sources."

In regard to such a policy, I have also attached an article I wrote that discusses the current physical protection requirements for HEU. While I do not believe that the existing physical protection limits should be changed at this time, I do argue that they should be supplemented with a policy similar to the ALARA standard in radiation protection that would require that the amount of HEU at a particular facility be kept "as low as reasonably achievable." All amounts of HEU carry some risk of being diverted. Since lower amounts of HEU mean lower risk to the public, then as a matter of policy, the amounts of HEU

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Add William R. Lamm 113055

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Acknowledged by card 11/23/84

should be kept "as low as reasonably achievable." If the risk can be reasonably set at zero, it should be done and the use of HEU avoided. Such a policy would make it easier to reduce inventories of HEU at facilities, could be implemented more quickly than a fundamental change in physical protection requirements, and would create a process that could cope with the inevitable increase in the future nuclear weapons skills and capabilities of terrorist groups or clandestine national programs that someday might try to divert enough HEU to make a nuclear explosive.

Thank you for the opportunity to comment of the proposed rule.

Sincerely,

David Albright
David Albright

Attachments

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OCT 21 AM 11:12
FEDERAL BUREAU OF INVESTIGATION
U.S. DEPARTMENT OF JUSTICE

Testimony Submitted For the Record of the September 25
Proceedings of the Subcommittee on Energy Development
and Applications and the Subcommittee on Energy
Research and Production

On the Conversion of Domestic Civilian Research and
Test Reactors to Low Enriched Uranium Fuel

by David Albright
Federation of American Scientists
Washington, D.C.
October 15, 1984

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Before I begin, I would like to thank the chairmen for holding open the record of the September 25 proceedings on the Nuclear Regulatory Commission's proposed rule for the conversion of the NRC licensed research and test reactors from highly enriched uranium (HEU) to low enriched uranium fuels (LEU). I hope, as I and several others expressed in our letter to the subcommittees, that an additional hearing on this subject will eventually be held. I still believe that it would be useful to hear a broader range of views about the need to convert research reactors to LEU fuels.

I would like to discuss several reasons why the NRC's proposed rule should be adapted in its present form and should be viewed as a beginning of the eventual conversion of all reactors in the United States that use HEU fuels. My comments reflect my work at the Federation of American Scientists (FAS) on the technical issues associated with nuclear proliferation. This testimony represents my own views and does not necessarily represent the views of FAS.

Background

Highly enriched uranium can be used to make nuclear explosives. Its widespread use in fuel in reactors increases the risks of proliferation through theft or diversion of the HEU. A single theft of HEU by an irresponsible government or a terrorist group could have profound consequences. It could be used to extort concessions from a government or to construct an explosive if enough is stolen. Furthermore, the theft could be perpetrated in any country. The irresponsible government or terrorist group might steal the HEU from the most responsible nation.

Currently, about 45 civilian research and test reactors in the United States and about 90 in foreign countries use HEU supplied by the United States. Each year these reactors need roughly 1100 kilograms of HEU, which requires that about four times this amount of HEU be in circulation in transport, in fuel fabrication plants, at the reactors, or at reprocessing plants (Travelli, 1983). The total amount in circulation represents, using conservative estimates, over 150 nuclear weapons equivalents. About 90 percent of the yearly civilian HEU requirements in the United States is used in the DOE civilian reactors. About half of the total annual U.S. requirement of HEU is used in one reactor, the DOE's Advanced Test Reactor at the Idaho National Engineering Laboratory.

Highly enriched uranium is also used in high temperature reactors. In the United States it is used in the commercial high temperature gas reactor at Fort St. Vrain in Colorado. And in West Germany the thorium high

temperature reactor (THTR) that is nearing operation will use HEU fuel. Each year the West German reactor will require about 170 kilograms of HEU (NF, 1984). The Fort St. Vrain reactor is roughly estimated to need about 220 kilograms of HEU per year (NEI, 1982).

United States policy has attempted to reduce the use of HEU in foreign research reactors. To this end, the reduced enrichment for research and test reactors (RERTR) program was established in 1978 by the Department of Energy. It has been developing and demonstrating new types of LEU fuels that can replace the HEU fuels without significantly affecting reactor performance or fuel cycle costs of most research reactors.

In 1982 the NRC issued a policy statement which stated that the NRC "is interested in reducing, to the maximum extent possible, the use of HEU in domestic and foreign research reactors (Federal Register, 1982)." The NRC's proposed rule has resulted from this policy statement.

Because the Fort St. Vrain reactor is a power reactor, it is not included in the NRC's proposed rule. In regard to the West German THTR, which is also not considered a research reactor, Nuclear Fuel reported that the Department of Defense is concerned about the United States supplying HEU to the West German reactor in the absence of any firm plans by the reactor owners to convert it to LEU fuels (NF, 1984). According to Nuclear Fuel, the Defense Department's concern was apparently prompted when the NRC postponed its decision on an export license to supply this reactor with additional HEU until the State Department decides whether the United States is prepared to commit itself to supplying HEU each year for the lifetime of the reactor (NF, 1984).

Concerning the DOE reactors, Dr. Kane, Deputy Director, Office of Energy Research, DOE, stated at the hearing held September 25, that any decision to convert DOE reactors is several years away, although few of the DOE reactors are presently expected to convert. Instead, he added, security at the reactors might be upgraded.

Reasons For Implementing the NRC's Proposed Rule

Congress should support the implementation of the NRC's proposed rule for the following reasons:

1. It would help reduce the future threat of terrorism within the United States by reducing the amount of HEU in circulation.

While at present NRC licensed research reactors do not seem to be a likely target of terrorist

groups, it is clear from past acts by international terrorist groups, as NRC Commissioner Bernthal noted, "that a threat can materialize without sufficient warning from intelligence sources."

Because the amount of HEU potentially affected by the NRC's proposed rule is only a relatively small part of the total amount used in the United States, Congress should not lose sight of the need to enlarge the number of reactors that will convert to LEU fuels. Congress can begin with the DOE civilian research reactors presently using HEU fuel and with a study on the feasibility of converting the high temperature reactor at Ft. St. Vrain to less enriched uranium fuels.

2. Conversion to LEU fuels would eliminate the need for any increased physical protection of the HEU fuels.

In the case of the university reactors, present levels of security are inadequate not only to protect the unirradiated HEU, but also, in several cases, the irradiated HEU, which in these cases is not sufficiently self-protecting to prevent its diversion (Hersch, 1984). The necessary increase in the physical protection of the HEU would be very expensive and these costs would most likely come out of the universities' budgets.

More generally, the constraints imposed on the university programs by the physical protection of HEU interfere with research activities and are incompatible with an open university environment.

3. Conversion of the NRC-licensed research and test reactors could very well reduce the threat of interventions at future relicensing hearings.

Reactor owners have often stated that conversion to LEU fuels might require a license amendment which would have a public hearing with the opportunity for public intervention. The owners fear that the public hearings would result in several research reactors being closed down.

While such fears cannot be dismissed lightly, the likelihood of such an intervention on a licensing amendment rather than a licensing renewal is rather remote. In fact, intervention might be less of a threat in the case of conversion, because so many groups on all sides of the nuclear debate support converting reactors to LEU fuels. These

groups have a vested interest in seeing that the conversion process is successful.

By avoiding converting to LEU fuels, research reactor owners might actually create an environment favoring interventions. Groups might decide to intervene because they are concerned about the proliferation risks of HEU regardless of the level of physical protection of the HEU fuels.

4. The NRC's proposed rule would help alleviate the frequently expressed concern of the foreign reactor owners that a "double standard may be applied in deciding the acceptability of using HEU in foreign and U.S. research reactors (GAO, 1882, p. 51)." While it is impossible to predict whether this type of concern by foreign reactor owners would undermine foreign conversion, it is in the interest of both the NRC and the DOE to require conversion of reactors under their authority in order to create the best possible precedent overseas.

At the fifth annual RERTR meeting in Japan during the fall of 1983, a U.S. government participant at the meeting noted that the likelihood of NRC-licensed reactors being required to convert was good news to the participants at the conference.

However, in comments on the NRC's proposed rule, Peter von der Hardt, director of the Petten research reactor in the Netherlands, stated that since the rule does not cover the large DOE research reactors, the example set by the conversion of the NRC licensed reactors is weakened.

Dr. von der Hardt's comment is a further argument for the conversion of more of the U.S. reactors that use HEU fuels. Rather than using his comment as a justification to weaken the NRC's proposed rule, as some of the research reactor owners have done, Congress should use it to justify a program that would enlarge the numbers of reactors that convert from HEU to LEU fuels.

5. Besides setting an example, the implementation of the NRC's proposed rule would lead to the development of valuable licensing and technical information. The NRC plans to share this information with the overseas reactor owners and

this sharing will contribute to a more efficient and economical conversion process overseas.

Conclusion

The NRC proposed rule is a sound rule that warrants the support of Congress. For this rule to be successful, however, Congress must continue to adequately fund DOE'S RERTR program and plan to pay all the conversion costs.

The conversion of the NRC-licensed reactors should be viewed as only a first step in eventually eliminating the use of HEU in reactors within the United States. It is a natural first step, however, since most of the NRC-licensed reactors are fairly small and relatively easy to convert compared to the other reactors. Congress should begin planning to convert all possible civilian reactors that use HEU fuels to the new LEU fuels as they become available.

References

Federal Register, 1982: "Use of High-Enriched Uranium in Research Reactors; A Policy Statement," NRC, Federal Register, vol. 47, no. 164, August 24, 1982, p. 37007.

GAO, 1982, "Obstacles to U.S. Ability to Control and Track Weapons-Grade Uranium Supplied Abroad," General Accounting Office, GAO/ID-82-21, August 2, 1982.

Hersch, 1984: Testimony by Daniel Hersch, Committee to Bridge the Gap, before the NRC, January 27, 1984.

NEI, 1982: Nuclear Engineering International, August Supplement, 1982. This journal lists the uranium fuel inventory of the Fort St. Vrain reactor as 870 kilograms. The uranium is enriched to over 90 percent uranium-235. The annual HEU requirement stated in the testimony was derived by assuming that one quarter of the uranium fuel is reloaded each year (see A.V. Nero, Guidebook to Nuclear Reactors, University of California Press, 1979, p. 126).

NF, 1984: --"HEU Shipment to West Germany Raises Concern of U.S. DOD," Nuclear Fuel, September 10, 1984, p. 2-3.

Travelli, 1983: "RERTR Program Activities Related to the Development and Application of New LEU Fuels," A. Travelli, Argonne National Laboratory, presented at the International Symposium on the Use and Development of Low and Medium Flux Reactors, MIT, October 17-19, 1983.

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The Amount of Weapon-Grade Uranium Needed to
Construct a Nuclear Explosive:

Are the Current Physical Protection
Requirements Adequate?

By
David Albright
Federation of American Scientists

November 17, 1984

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The Nuclear Regulatory Commission (NRC) is trying to decide whether to require the conversion of non-power reactors from highly enriched uranium (HEU, containing more than 20 percent uranium-235) to low enriched uranium fuels. Most participants in this debate agree that the inventories of HEU should be reduced. However, there is considerable disagreement about what quantity of HEU presents a significant risk. At issue is the amount of HEU required by a terrorist or national group to make a nuclear explosive. Also in question is the appropriate threshold quantity of HEU, above which maximum amounts of physical protection must be provided.

Highly enriched uranium can be used directly in nuclear weapons, and thus, is more of a proliferation risk than less enriched uranium. According to a General Accounting Office report, State Department and Arms Control and Disarmament Agency officials concluded in 1978 that:

"a single seizure of a significant quantity of HEU by an irresponsible government or terrorist group could have profound repercussions for the security of all nations and would almost certainly have a highly negative impact on all peaceful nuclear activities to the detriment of all nations. Furthermore, the officials said that the dangers are not limited to material located in irresponsible nations. They said that an irresponsible nation, or a sub-national group, might seize material from the territory of the most responsible nation." (GAO, 1982, p. 4)

According to former nuclear weapons designer Ted Taylor, the perception that nuclear weapons are too technically complex to be constructed by terrorist or inexperienced national groups no longer exists, because such weapons have in fact been built and much of the necessary technical information is now declassified (Willrich, 1974, pp. 5-6). Some of Taylor's conclusions have been criticized, but a number of his critics do admit that the above conclusion is reasonable, if the weapons in question use highly enriched uranium (Meyer, 1977, p. 434).

NRC physical protection requirements contain a threshold amount above which HEU requires substantially more protection. Briefly, the minimum objective of this policy is that thefts from a single facility which has over 5 kilograms of uranium-235 contained in non-self protecting* HEU must be detected and prevented, while thefts from a facility which has under 5 kilograms must be detected and responded to, but not necessarily prevented.

* radiation exposure is less than 100 rem per hour at 3 feet from material.

The Department of Energy has stated that more than one theft equal to 5 kilograms of uranium-235 contained in HEU would be required to construct a clandestine fission explosive. According to Taylor, who designed the largest and smallest yield fission bombs, the amount of HEU required to make a nuclear explosion is not a well-defined number (Taylor, 1984). It depends on the design of the bomb, i.e. whether it is an implosion or gun-assembly explosive, the enrichment of the HEU, the type and amount of neutron-reflecting material surrounding the HEU, the shape of the HEU, the type and quality of the equipment and facilities available to the weapons designers, and, most important of all, the talents, needs, and experience of these designers (Willrich, 1974). Consequently, any determination of this quantity must combine basic weapon physics with an evaluation of the technical difficulty a terrorist group or clandestine national program would face in actually constructing a nuclear device. A detailed analysis would necessarily involve highly classified information, but a rough, "first order" analysis can be done using only publicly available information, sufficient for making some general conclusions about the physical protection issues discussed above.

The critical mass of HEU when it is surrounded by neutron-reflecting materials is listed in various publications. Using beryllium as a reflector produces the lowest critical masses of HEU that are contained in the unclassified literature (Paxton, 1975). If the beryllium reflector is 4.6 inches thick, the critical mass of a uniform, spherical piece of weapon-grade uranium (enriched to about 94 percent uranium-235) metal is about 13 kilograms of uranium-235 (Paxton, 1975, p. 13). If the thickness of the beryllium is only 1.9 inches, then the critical mass of the HEU metal enriched to 94 percent is about 22 kilograms of uranium-235 (Paxton, 1975, p. 13). If instead of beryllium, natural uranium is used as a reflector, then a sphere of 94 percent HEU metal has a critical mass of about 19 kilograms of uranium-235 when it is surrounded by about 4 inches of natural uranium and about 25 kilograms of uranium-235 when it is surrounded by 1.75 inches of natural uranium (Paxton, 1975, p. 8).

A nuclear weapon cannot be only critical. It must be sufficiently supercritical or contain enough additional uranium-235 to produce an explosion. The pressures that develop in a nuclear explosive are so large that the core will rapidly expand to a subcritical configuration. Obtaining an effective explosion depends on whether the fission reaction is stopped by these pressures before an appreciable fraction of the uranium-235 has fissioned. Surrounding the HEU by a reflector also serves to hold the core together longer which increases the yield. As a result, the reflector is often called a tamper.

The amount of HEU over one critical mass necessary to produce an explosion is classified. It is clear, though, that assembling one critical mass is not enough to make an explosion, two critical masses is enough for an explosion with a yield equivalent to several hundred tons of high explosives (Foster, 1970, p. 521), and three critical masses is probably enough for a high yield explosion. Assembling one critical mass or slightly above this amount would produce intense radiation within the immediate area. An inefficient, low-yield explosion could be obtained with more than one but less than two critical masses. These low yield weapons also present a great danger, particularly from their radiation effects. The radiation from the detonation would be lethal out to a larger distance than its blast effects (Willrich, 1974, table 2-1). Even a nuclear explosive that has a yield equivalent to only one ton of high explosive would produce enough neutron radiation to deliver fatal doses to people within about 120 meters of the blast, but would produce moderate blast damage (3 psi) out to only about half that radius (Willrich, 1974, table 2-1). For the purposes of this discussion, it is assumed that an explosion can be achieved with between one and two critical masses, although it is understood that assembling between one critical mass and some unknown amount greater than one critical mass will produce effectively zero yield.

There are two basic types of nuclear explosive designs that are used to achieve a supercritical mass - the gun-type and the implosion-type device. In a gun-type bomb two subcritical masses of fissionable material are brought together into a supercritical mass. The bomb detonated over Hiroshima at the end of World War II was a gun-assembly explosive that contained 60 kilograms of uranium enriched to over 90 percent (McPhee, 1974, p. 14). In order to assemble between one and two critical masses of uranium-235 contained in weapon-grade uranium and surrounded by the neutron reflectors discussed earlier, a designer would need between 13 and 50 kilograms of uranium-235.

The implosion design involves surrounding a subcritical mass of fissionable material by chemical high explosives. If the explosives are uniformly detonated, then they produce an ingoing shock wave that strikes the fissionable material and provides the necessary compression to produce a supercritical mass. The implosion design requires considerably less HEU than the gun assembly design. When a sphere of HEU of uniform density surrounded by a reflector assembly is uniformly compressed, the critical mass of the compressed HEU is proportional to the inverse of the square of its density. The chemical explosion in an implosion-type nuclear weapon will be assumed to be capable of doubling the density of the HEU in the core. Thus, when a spherical core of HEU and a combined reflector and tamper that

is initially only one quarter of its critical mass is compressed to twice its initial density, it will correspond to one critical mass. When using the four neutron reflectors considered above, doubling the density of the HEU metal lowers the critical mass to only 3.3 to about 6.3 kilograms of uranium-235. With the thick beryllium reflector considered earlier, 3.3 to 6.6 kilograms of uranium-235 are required to assemble one to two critical masses. Similarly, with the thin natural uranium reflector, 6.3 to 12.6 kilograms of uranium-235 are required.

Presently, it appears doubtful that a terrorist group could build a device that doubles the density of the core, but it is possible for an inexperienced national program. Whether an inexperienced designer could obtain significantly more than a twofold increase in density requires a more sophisticated analysis than the one presented in this paper. Clearly, increasing the density of the HEU in the core by a factor of three or four rather than a factor of two will require a much more sophisticated implosion design, because it becomes increasingly difficult to further compress the metal. This results not only from the metal's increasing resistance to further compression, but also to the outward pressures produced by the initiation of the fission reaction.

Groups wanting to construct an explosive from HEU will require larger amounts than just the amounts stated above. Some of the HEU will be lost during the processing of the HEU into metal and its fabrication into bomb parts. However, it is reasonable to assume that process losses will probably not exceed 10 to 20 percent of the original amount.

Using the reflectors considered above and the assumptions made in this report, an implosion design could be constructed with a yield equivalent to several hundred tons of high explosive from roughly 8 to 15 kilograms of weapon-grade uranium. Under the same conditions lower yield weapons could be constructed with smaller amounts of HEU, perhaps as low as 5 kilograms of weapon-grade uranium.

It is highly unlikely that either a terrorist or inexperienced nation could construct a nuclear explosive with less than 5 kilograms of weapon-grade uranium. However, this very rough analysis suggests that an inexperienced national program might be able to produce a low yield explosion with between 5 and 10 kilograms of weapon-grade uranium. As a result, it is arguable whether adequate conservatism is built into the existing physical protection limits.

Moreover, the current physical protection limits do not allow for simultaneous thefts from a few facilities. Because 5 kilograms of uranium-235 is the limit between very stringent physical protection requirements and lesser requirements, an

incentive exists to store somewhat less than 5 kilograms of HEU, which has indeed happened at university research reactors. But enough HEU to construct an explosive could be stolen from only a few of these facilities, each of which contains less than 5 kilograms of uranium-235.

The most difficult part of any analysis to determine the amount of HEU required to make a nuclear explosive is to estimate the capabilities of the groups which might divert HEU and actually build a nuclear explosive. All conclusions about the amount of HEU required to make an explosive result from an analysis of the present capabilities of terrorist and national groups to make such a device. Their future capabilities will most likely increase and the extent of that increase is the largest uncertainty in any estimate of the amount of HEU necessary to make a nuclear explosive.

The current physical protection requirements need to be strengthened. Instead of lowering the current physical protection limits, a more fruitful approach would be to supplement them with a policy similar to the "as low as reasonably achievable" (ALARA) criterion in radiation exposure. All amounts of HEU carry some risk of being diverted. Since lower amounts of HEU mean lower risk to the public, then as a matter of policy, the amounts of HEU should be kept "as low as reasonably achievable." If the risk can be reasonably set at zero, it should be done and the use of HEU avoided. Such a policy would make it easier to reduce inventories of HEU at facilities, could be implemented more quickly than a fundamental change in physical protection requirements, and would create a process that could cope with the inevitable increase in the future nuclear weapons skills and capabilities of terrorist groups or clandestine national programs that someday might try to divert enough HEU to make a nuclear explosive.

An ALARA approach to the permissible amount of HEU at a facility is not limited to facilities that contain relatively small amounts of HEU or, in fact, to just HEU. It could just as easily be applied to facilities that use plutonium or large amounts of HEU. In each case an analysis could be done that seeks to keep the amount of these materials as low as reasonably achievable.

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DOCKET NUMBER

PROPOSED RULE

PR-58

(61)

(49 FR 27769)

DOCKETED
JUN 10

84 SEP 25 12:48

September 17, 1984

RECEIVED

OCT -5 12:24

DOCKETING & SERVICE
BRANCH

Secretary of the Commission
Nuclear Regulatory Commission
Washington, DC 20555

Att: Docketing & Service Branch

Gentlemen:

I am writing to express my support for the conversion of all nuclear reactors which use highly enriched uranium.

This material, which can be used in an atomic weapon, poses an unnecessary threat to nation and international security. We should not wait until such fuel is stolen; we must convert these reactors now. The financial cost of conversion is insignificant compared to the potential costs involved if a successful theft of fuel were carried out.

Conversion of these reactors and removal of the weapons-grade fuel can be a signal to the rest of the world that the United States takes seriously the problem of nuclear weapons proliferation. This proposal could help to discourage the use of HEU fuel worldwide.

However, in order to be effective, it must be non-voluntary and it must be promptly implemented.

Very truly yours,

Minna Kaye
MINNA KAYE

310 S. Sherbourne Dr.-#106 -
Los Angeles, Ca. 90048

8409270310 840917
PDR PR
50 49FR27769 PDR

Acknowledged by card

9/25/84

pd

Associated Students of the University of California

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SANTA BARBARA • SAN DIEGO

STUDENT BODY PRESIDENTS' COUNCIL

'8' SEP 24 P2:24

September 12, 1984

Chairman Palladino
Commissioner Asselstine
Commissioner Roberts
Commissioner Bernthal
Commissioner Zech
U.S. Nuclear Commission
Washington, D.C. 20555

Dear Commissioners:

Due to the unique proliferation hazards involved, you have recently issued a proposed regulation to convert U.S. nuclear research reactors from the use of weapons-grade (highly enriched) uranium. The Congress has appropriated \$2 million for the first year to being the conversions.

The Student Body Presidents' Council of the University of California, representing 140,000 students on nine campuses, strongly supports conversion of all research reactors to non-bomb-grade uranium. We, therefore, applaud your proposed action in this regard and urge that it go forward expeditiously, without diminishing its intent of enhancing national and international security.

Enclosed, please find the SBPC resolution and our comments on the proposed rule as published in the Federal Register.

We urge your continuing attention to this important matter.

Sincerely,

Kayleen S. Kott
Chair, Student Body Presidents' Council
359 Memorial Union
University of California
Davis, CA 95616

cc, Representatives Udall, Markey, Ottinger, Brown, Levine, Beilenson
Senators Hatfield, Cranston, Wilson

Enclosures

KSK:jeb

8409270302 6pp

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SANTA BARBARA • SAN DIEGO

STUDENT BODY PRESIDENTS' COUNCIL

RESOLUTION

Supporting the Proposed Rule by the Nuclear Regulatory Commission on Limiting the Use of Highly Enriched Uranium in Domestic Research and Test Reactors

WHEREAS, 31 non-power nuclear reactors are licensed in the United States to use highly enriched uranium (HEU)- 25 are owned by universities including one at UCLA and one at UC Santa Barbara, 5 are owned by private corporations and 1 is owned by the U.S. government; and

WHEREAS, highly enriched uranium can be used without further significant processing and without extensive expertise to build nuclear weapons; and

WHEREAS, the security level at these facilities especially at those on university campuses are not sufficient to even moderately protect from a threat of theft; and

WHEREAS, the threat of terrorism is rapidly escalating world-wide and HEU could sell for over \$100,000 per kilogram on the black market; and

WHEREAS, the United States government has spoken out around the world for the reduction of HEU, while at the same time the U.S. exports about 600 kilograms annually (the most in the world) and has not made an effort to limit the almost 500 kilograms of HEU within the U.S.; and

WHEREAS, the reduction of HEU within the U.S. may provide an example and incentive for other nations to emulate thus reducing the danger of international terrorism; and

WHEREAS, the low enriched uranium (LEU) fuels can be used without significant reduction in performance or research potential; now, therefore, be it

RESOLVED, that the Student Body Presidents' Council supports immediate conversion from HEU to LEU internationally and especially within the United States and that the rule must allow no exemptions if it is to accomplish its goal of enhancing national and international security.

8/18/84

KJG

Associated Students of the University of California

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STUDENT BODY PRESIDENTS' COUNCIL

August 29, 1984

Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: HEU Conversion Rule (49 Federal Register 27769)

Dear Sir:

The Student Body Presidents' Council of the University of California, representing 140,000 students on nine campuses, strongly supports the proposed regulation to require conversion of all non-power reactors from highly enriched uranium (HEU) to the safer low enriched uranium (LEU). Enclosed, please find a copy of an SBPC resolution (8/18/84) supporting immediate conversion allowing no exemptions and thus enhancing national and international security.

The SBPC does not understand the NRC's preoccupation with the cost of conversion. We understand that financial considerations are important in determining the availability of LEU fuel (which for many facilities is free or relatively inexpensive due to oversupply at similar facilities) and that the scheduling of conversion does involve some financial considerations. However, it does not seem appropriate that the NRC concern itself with the "economics of conversion" as much as it should serve the public by assuring both public health and safety. If the NRC passes stringent regulations, the federal government will be encouraged to provide funding such as the Department of Energy has shown with \$2 million to begin conversion in the first year. The cost of conversion, no matter who pays, is minimal compared to the cost of theft or accident at these research reactors. The cost of improving security at these research reactors to adequately protect this valuable and vulnerable material must also be considered.

The time frame proposed by the NRC is of concern to the students of California. According to the proposed rule, a licensee would not even be required to submit a proposed schedule for conversion for 12 months after passage of this rule. We believe one year is too long to wait to begin actual conversion. Furthermore, this regulation does not establish a date by which licensees must complete conversion. The scheduling of shipping casks should not affect the time frame since transportation time even across country could be not more than a few weeks. Also, conversion dates should not be affected by federal funding since the individual licensees have a responsibility to assure that their reactors comply to safety regulations.

The idea of "generic envelopes of safety limits for the several types of non-power reactors" is not acceptable to SBPC, although we do see the need for generic safety analysis for fuels. Licensees should not be required to merely submit to

a set of vague generic rules, but rather be required to prove conversion has created no reduction in safety. If there are any questions as to the safety of the reactors due to conversion the public should be allowed to address these questions in a public hearing. The right to public hearing on safety issues is guaranteed by the Atomic Energy Act, and should not be forfeited in this regulation or any regulation. Also, licensees should be required to conduct an environmental impact statement for any questions of safety or health. This statement like the "analysis showing that...normal operating and postulated accident conditions...fall within the limits" must be carefully checked by the NRC and be available for public inspection.

The possibility for exemptions seems overly lenient in this regulation. Reactors with a "unique purpose" could be exempt from conversion which could diminish the intent of the regulation which is to enhance national and international security. The regulation states reactors with "a special experiment or program" would be a candidate for exemption. One experiment should not overturn this needed regulation. Those research projects based on neutron flux levels or spectra are attainable with LEU fuels, as well as HEU fuels, with only slight modifications.

The NRC is encouraged to require MEU (medium enriched uranium) as close to 20% in those very rare cases where LEU, below 20%, is not possible. However, in almost all domestic research reactors, conversion below 20% is possible at this time. For this reason, the "continued success of the DOE funded RERTR program," although desirable, is not crucial to the success of HEU conversion.

In summary, the SBPC makes the following recommendations:

The NRC base its decision for conversion of non-power reactors on the safety and health of the public and not on economic considerations.

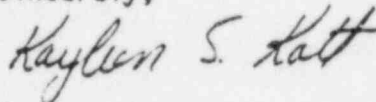
The time frame to submit a schedule for conversion be shortened and that the NRC set a date for complete conversion of reactors.

There be no generic envelopes of safety limits, but rather licensees be required to prove no reduction in safety has been created by conversion.

The public retain the right to public hearing on any questions of public safety.

No exemptions be granted for domestic conversion.

Sincerely,



Kayleen S. Kott
Chair, Student Body Presidents' Council
359 Memorial Union
University of California
Davis, CA 95616

KSK:jeb

Enclosure

DOCKET NUMBER
PROPOSED RULE

PR-50
(49 FR 27769)

(2)

9-20-84

DOCKETED
USNRC

'84 SEP 24 P1:08

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

Sir:

We support your plan for the HEU
Conversion.

I am referring to the plan to
go from HEU to LEU fuel.

The idea that a dangerous substance
could be stolen & diverted (HEU) to
make an atomic bomb is devastating.

The already endangered planet
can afford no more danger.

Sincerely

Mr. M. Holland

9019 Wonderland Park

LA CA 90046

DOCKET NUMBER

PROPOSED RULE

P.L. - 58 (58)

(49 FR 27769)

DOCKETED
USMRC**Bettine Wallin**

8501 Ridpath Dr. • Los Angeles, California 90046 • (213) 654-0052

'84 SEP 24 P1:14

Sept 20, 1984

DOCKETING & SERVICE
BRANCH

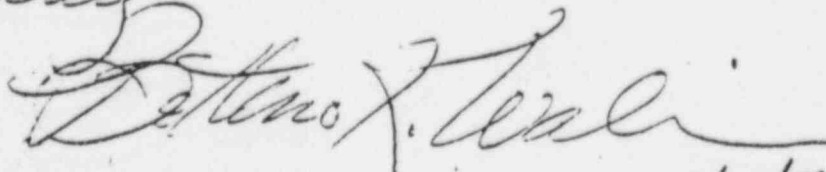
Attn: Docketing & Service Branch
 Secretary of the Commission
 U.S. Nuclear Regulatory Commission
 Washington D.C. 20555

Dear Sirs:

re: HEU Conversion rule
 49 Federal Register 27769

I urge you to support the change
 in regulations away from weapons
 grade uranium in university reactors
 where they are more susceptible to
 theft. We need to seriously stop
 the chance of proliferation

Sincerely,



Acknowledged by card

9/25/84

pa

BUCKET NUMBER

PROPOSED BY

PR-50
(49 FR 27769)

20

August 16, 1984

RECEIVED
Secretary of the Commission
Nuclear Regulatory Commission
Washington, DC 20555

DOCKETED
USNRC

Re: Rule Making on Low-Enriched Uranium Fuel in Non-Power Reactors
84 AGO 27 P12:27

Dear Sir,

Attached you will find my testimony that I presented on June 12, 1984 before the Advisory Committee on Reactor Safeguards on

THE NEED TO CONVERT DOMESTIC RESEARCH REACTORS FROM HIGHLY ENRICHED TO LOW-ENRICHED URANIUM FUELS.

Because of the desire to make our national policy on HEU consistent with our rules on the export of HEU, I hope that the NRC rules will be carried out on most of the research reactors fairly promptly, within five years from the present time. It is my conviction that funding will be available from the U.S. Congress to assist these conversions; the Congress will respond to accelerate the pace of conversion. Because of this judgement, I don't think the phrase "economics of conversion" should be used to avoid the change. Of course, there will be a few reactors where the technical feasibility will be more difficult, but this exemption should be true only in a few cases. If I can be of any assistance, please do not hesitate to contact me.

Sincerely,

David Hafemeister
David Hafemeister
553 Serrano
San Luis Obispo, CA 93401
(805-544-5096)

Attachment: June 12, 1984 testimony

8408310212 840816
PDR PR
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DSIC 1/1
ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED

8/29/84
pk

STATEMENT OF DR. DAVID W. HAFEMEISTER

Before the Advisory Committee on Reactor Safeguards
Nuclear Regulatory Commission
Regarding the Need to Convert Domestic Research Reactors
from Highly Enriched to Low-Enriched Uranium Fuels
June 12, 1984

BIOGRAPHY BRIEF. From 1962 to 1966, I used research reactors at the University of Illinois and at the Los Alamos Scientific Laboratory to carry out experiments in nuclear and solid state physics. From 1975 to 1977, I was Science Advisor to Senator John Glenn, who was the Ad-Hoc Chairman of the Governmental Affairs Committee on Nonproliferation matters. From 1977-79 I was Special Assistant and Expert Consultant to Under Secretary of State Lucy Benson and Deputy Under Secretary Joseph Nye, working primarily on nonproliferation matters. I am presently a Visiting Scientist at the Massachusetts Institute of Technology, and I am Professor of Physics at the California Polytechnic University, San Luis Obispo, California. My Curriculum Vitae is attached.

CONCLUSION: It is my opinion that research reactors in the U.S. should be required to convert from high-enriched uranium fuels (HEU) to low-enriched uranium fuels (LEU). The lower flux reactors can convert to the presently available uranium-aluminum fuels, and the higher flux reactors can convert to the uranium-silicon fuels which will be available in a few years. Exceptions to this conversion should be allowed only upon a finding that the new fuels would not be feasible. This conclusion is based on (1) requirements for adequate physical security, (2) consistency with the national policy on nonproliferation, and (3) technical availability of the new LEU fuels. If the reactor fuels are not converted to LEU, then the radiation barrier for each bundle should be maintained at a minimum of about 100 REM/hour (unshielded at 3 feet).

WEAPONS IMPLICATIONS. There is general agreement that highly-enriched uranium and plutonium are dangerous in that nuclear weapons can be fabricated from these materials. The American Nuclear Society acknowledges this problem. In a recent study (C. Starr, Science 224, 952 (1984)), the American Nuclear Society stated that:

"There are now about 350 research reactors in about 50 countries, of which 25 are developing countries. Many of these reactors are too small to produce significant amounts of plutonium. However, most of them have been supplied with highly enriched uranium fuel, which, in principle, might be accumulated to make a single nuclear device. This possibility is now being precluded by conversion to lower enrichment (less than 20 percent) designs."

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HEU WEAPONS. Since HEU can be used directly to fashion a clandestine fission explosive by either a state or a terrorist group, the use of HEU should be minimized, and when HEU is used it must be under adequate physical security. LEU is considerably less effective as a nuclear explosion since (1) it requires about 15 times more LEU uranium than HEU uranium (with reflectors), (2) about 3 times more U-235, and (3) it is much more difficult to develop and deliver a nuclear weapon that consists of hundreds of kilograms of uranium.

HISTORICAL PERSPECTIVE. The Indian device of 1974 heightened concerns in the U.S., the Congress, and the Executive Branch. Shortly after this event, about one-half dozen contracts were signed to export enrichment and reprocessing plants to smaller nations, many of which did not have an economic need for such facilities. In response to these events, the Congress commissioned a study by the Office of Technology Assessment. The OTA report (1977) acknowledged that solutions to nuclear nonproliferation are not simple by stating that:

"There are no single or all-purpose solutions; no short-cuts. A viable nonproliferation policy will require the coordinated, planned use of a wide variety of measures."

THE RESPONSE OF THE CONGRESS. The U.S. Congress (essentially unanimously) responded to this situation by passing the Nuclear Nonproliferation Act of 1978 (NNPA) and the Glenn-Symington Amendment. As a result of these and other actions, the U.S. policy is to minimize the use of HEU in the world. The U.S. government has not exported HEU for lower-flux reactors, and it has asked for conversion to higher density fuels in the future for higher-flux reactors. This program, known as the Reduced-Enrichment Research and Test Reactor Program (RETR), represents the official policy of the United States aimed at attempting to reduce enrichments of research reactor fuels and thus the amount of HEU in use.

INTERNATIONAL RESPONSE. The summary report of the International Nuclear Fuel Cycle Evaluation (1980) has stated that it is feasible to markedly reduce the uranium enrichment of a great majority of research reactors: INFCE endorsed the conversion of HEU fueled research reactors to lower enrichment.

HEU EXPORT LICENSES. The U.S. no longer will accept new commitments to export HEU for foreign research reactors. New research reactors are being sold only with LEU fuels. A few commitments for HEU for high-flux research reactors are being carried out on an interim basis to Belgium, France, Holland and Japan, but, we have asked them to convert to LEU, and, as I understand it, they have agreed to do so. Recently, the U.S. did export 0.9 kg of HEU to the Canadian-built SLOW POKE reactor in Jamaica, but the Canadians have stated they will not request any more HEU for their research reactors.

HEU AND THE APPLICATION OF THE GLENN-SYMLINGTON AMENDMENT. This amendment denies military and economic aid to those non-nuclear weapons states that (a) explode a nuclear device, or (b) build enrichment and reprocessing facilities outside of an international framework. On April 6, 1979, this sanction was applied to Pakistan since it was concluded that Pakistan was building an enrichment plant to produce weapons-grade uranium. This sanction was later removed because of the Soviet invasion of Afghanistan. I was intimately involved with this amendment while

working with Senator Glenn (joining him in the House-Senate Conference where the House accepted the Senate language), and while working in the State Department (debating its merits before the Deputy Secretary of State, at OMB meetings, writing testimony, etc.) This amendment was adopted without dissent in the Congress. The Congress was, and is, concerned about HEU in unstable places.

HEU IN THE IRAQI REACTOR This reactor was destroyed by Israel in 1981. France no longer will export HEU to Iraq, but they will export LEU to Iraq.

CONSISTENCY IN FOREIGN POLICY. The professional staffs concerned with nonproliferation matters are convinced that it would be helpful to convert U.S. research reactors in order to be consistent with the French, Canadian, and American positions. Interagency meetings at OMB might try to soften this position, but I know of no serious nonproliferation staff member who would disagree with the conversion requirement. As we have seen from the examples of Pakistan and Iraq, nonproliferation can be compromised by other foreign policy concerns. It is true that the carrying out of a sanction against one nation, may well cost us in our diplomatic standing with that nation, and that larger events (such as the Soviet invasion of Afghanistan) can push nonproliferation policy the other way, towards ignoring the problem. The beauty of the HEU conversion proposal is that, for at most \$15 million, the U.S. can achieve consistency between what we demand of others and what we demand of ourselves. I have found out from personal experience when dealing with nuclear officials of other nations that "moral leadership" quite often does not work in foreign policy, but most of us would agree that being inconsistent by favoring our university reactors with HEU will certainly make the political climate abroad for the HEU to LEU conversions all the more difficult. In the area of nonproliferation policy, the \$15 million figure is relatively minor, as compared to other costs in this area.

PHYSICAL SECURITY. Section 10 CFR 73.67(a)(1) states that

"Each licensee ... shall establish and maintain a physical protection system that will achieve the following objectives:

(i) Minimize the possibilities for unauthorized removal of special nuclear material consistent with the potential consequences of such actions: and

(ii) Facilitate the location and recovery of missing special nuclear material."

First of all, I would like to address the word "consequences" in (i). The consequences of obtaining HEU could be the development of a nuclear device which could destabilize our international framework of nations. This extremely serious event might kill thousands of people and could be a precursor to an international conflict. Next I would like to address the word "consistent" in (i). To minimize the possibilities of unauthorized removal in a way which is consistent with the seriousness of the potential consequences of such a removal means that very stringent physical security and recovery techniques must be available. The (hypothetical) intrusion must be site-specific. Is the facility really secure? The time line of possible recovery must be considered. How long would it take for a recovery team to arrive? Would the signal be triggered by the penetration

into the building, and would there be time delays before the penetration of the secondary barriers? From where would recovery team come? Would the detection devices be applicable for fuel that was not very radioactive? How far can a vehicle travel during this time to get away with the fuel? What is scan rate of the aircraft? If it is 70 square kilometers per hour, then this would imply a radius of 4.7 km (3 miles). The minimum velocity of the escape vehicle would have to be

$$V \text{ (MPH)} = 3/T$$

where T is the arrival time in hours of the monitoring aircraft after the first signal. If it took one hour after detecting the first signal of the violation to obtain a scanning aircraft above the reactor, the minimum velocity of the vehicle would be 3 MPH. It is difficult to imagine any vehicle being slow enough to get caught under this circumstances. In other words, it would seem that a significant time delay would be needed between the time of first penetration of the building, and the theft of the fuel.

LEU vs. HEU. As we have indicated above, LEU weapons are feasible, but much less likely than HEU weapons. Transporting LEU under an armed guard is clearly less dangerous than the similar transporting of HEU, and certainly the storage of LEU on-site is also considerably less risky than storing HEU on site.

RADIATION BARRIER. As I understand it, the radiation level of a bundle of fuel would drop to about 10 REM/hour (unshielded at 3 feet) in about 7 days after shutdown. It would appear necessary to maintain higher levels of radiation, say about 100 REM/hour at 3 feet, to discourage theft.

CONCLUSIONS: Research reactors in the U.S. should be required to convert from HEU to LEU. The lower-flux reactors should do this within the near term, and the higher-flux reactors should convert to LEU when the U-Si fuels are available. Exceptions should be permitted only for the very rare case where it can be shown that this conversion is infeasible. If the reactors are not converted to LEU, then the reactors should be operated so that the fuel bundles will have a high radiation barrier, of the order of 100 REM/hour at 3 feet.

David W. Hafemeister

Professional Qualifications

1. Education:

- a. Bachelor of Science degree in Mechanical Engineering from Northwestern University, 1957
- b. MS. and Ph.D. in Physics, University of Illinois, 1959, 1964
- c. Post-Doctoral Fellowships:
 - Los Alamos Scientific Laboratory (1964-66)
 - American Association for the Advancement of Science Congressional Fellowship (1975-1976)

2. Employment

- a. Mechanical Engineer, Argonne National Lab (1957-58)
- b. Physicist, Los Alamos Scientific Laboratory (1964-66)
- c. Assistant Professor of Physics, Carnegie-Mellon University (1966-69)
- d. Associate Professor of Physics (1969-72)
 - Professor of Physics (1972-)
 - California Polytechnic University, San Luis Obispo, CA
- e. Visiting Professor of Physics
 - University of Groningen, The Netherlands (1972, 1980)
- f. Legislative Assistant and Science Advisor to Senator John Glenn U.S. Senate (1975-77)
- g. Special Assistant to Under-Secretary of State Lucy Benson and Deputy-Under Secretary Joseph Nye, U.S. Department of State (1977-1979)
- h. Visiting Scientist, Mass. Instit. of Technology (1983-4)

3. Experience with Nuclear Non-Proliferation Matters

- a. U.S. Senate: After the detonation by India of a nuclear device in 1974, the Committee on Governmental Affairs of the U.S. Senate held extensive hearings on the "Export Reorganization Act of 1975" which dealt with nuclear nonproliferation. It was my job to be the full-time staffperson to the Ad-hoc Chairman of the Committee, Senator Glenn, on hearings and mark-up of the act. I was Senator Glenn's main advisor on nuclear non-proliferation matters.
- b. Department of State: In 1977, I was appointed as one of two Special Assistant on the issue of nuclear nonproliferation to Under-Secretary Benson and Deputy-Under Secretary Nye. Dr. Nye had the lead role for nuclear non-proliferation in the Executive Branch and at the London Nuclear Supplier Negotiations.

During this time, I was intimately involved with the drafting and passage of the Nuclear Non-Proliferation Act of 1978, participating in the Department of Energy's Non-proliferation Alternative Systems Assessment Program (NASAP), and dealing as a representative of the Under Secretary with officials of other nations' nuclear programs.

In addition, I was the lead State Department delegate to Working Group 8 (Advanced Fuel Cycle and Reactor Concepts) of the International Fuel Cycle Evaluation (INFCE) which was held at the International Atomic Energy Agency (IAEA) in Vienna. Subgroup C of this Working Group had as its sole task the assessment of methods of reducing proliferation risks associated with research reactors. DOS member of interagency Subgroup on Nuclear Exports (SNEC).

4. Publications

a. Nuclear Non-Proliferation:

- i. "Nonproliferation and Alternative Nuclear Technologies", Technology Review 81, 58 (December 1978).
- ii. "Science and Society Test V: Nuclear Nonproliferation", American Journal of Physics 48, 112 (1980)
- iii. prime author/editor of the Presidential Report to the Congress on the environmental impacts associated with nuclear exports abroad (1980)
- iv. co-author/editor of the Supplement Nuclear Research and Development Export Activities to ERDA 1542 (U.S. Nuclear Export Activities), September 1979.

b. Solid State and Nuclear Physics:

20 articles; four book chapters; one book

c. Energy Technology and Policy:

15 articles, co-edited 2 books

August 16, 1984

End Nuclear Dumping in the Pacific
614 Gretna Green Way
Los Angeles, CA 90049

DOCKETED
USNRC

Secretary of the Commission
Nuclear Regulatory Commission
Washington, D.C. 20555
Attn.: Docketing and Service Branch '84 AGO 20 P12:55

To the NRC Docketing and Service Branch:

DOCKETING & SERVICE

End Nuclear Dumping in the Pacific strongly supports your recommendation for the conversion of the nuclear reactors under your jurisdiction (largely the ones on college campuses) to readily available and plentiful low-enriched uranium fuel. There has been such a conversion at the Univ. of Maryland which was very successful and smooth, while the Univ. of Michigan is presently undergoing such a wise conversion. The cost of converting to LEU fuel is tiny compared with the cost of making properly secure the nuclear reactors on college campuses.

With the publicity surrounding the 1984 Summer Olympics in Los Angeles, many people are familiar with the controversy over the U.C.L.A. reactor and more aware of the potential for a nuclear device to be made from the fuel and by-products of this and other campus reactors. Domestic targets, possibly nuclear reactors themselves, might well be the target of someone who might steal this dangerous, laxly-guarded material from our campuses.

We need prevention of this fuel being diverted into the production of a bomb, not scholarly probability assessments. You are as aware as I about the disappearance of bomb-grade nuclear material which has ended up in the Middle East, among terrorist groups, and elsewhere. The example of converting U.S. college reactors to LEU fuel would set a fine precedent, and make more secure U.S. corporate investments and facilities on many continents.

The argument that vital research cannot take place with using just LEU fuel is ridiculous. Obviously, the NRC does not determine what goes on at military-related facilities. Thus, I oppose the suggestion that our national security will be impaired unless a few of the reactors under NRC jurisdiction continue using HEU fuel. The safer LEU fuel is available now; let's move forward toward conversion. The Department of Energy could quite likely pay for the conversion, while you are likely aware that New York Congressman Ottinger (Chair of the House Energy and Commerce Subcommittee on Energy Conservation and Power) has offered to sponsor a bill to pay the costs for this vitally necessary conversion.

Sincerely concerned,

Bruce Campbell

Bruce Campbell

for

End Nuclear Dumping in the Pacific

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DSIC

add William R. Lohs 113055

DOCKET NUMBER
PROPOSED RULE
(49 FR 27769) PR-50

(16)

Allen Blumenthal
805 E. Berkeley Ave.
Santa Ana, Ca. 92707
August 21, 1984

RECEIVED
Secretary of the Commission
Nuclear Regulatory Commission
Washington, D.C. 20555
Att: Docketing & Service Branch-6 A9:03

'84 AUG 24 A9:55

Dear Secretary:

PUBLIC DOCS

I am writing this letter in support of your proposed rule requiring research reactors to convert to low enriched fuel (LEU). Research reactors are often in populated communities and colleges. As such, they pose serious problems of safety, sabotage, theft, and terrorism. It is too easy to obtain access to these areas and thus pose the ~~great~~ threats just discussed. It makes it too easy for "fringe groups" to obtain and use this fuel for their own purposes.

The other alternative, massive security systems, is just as uninviting. They are expensive and take away needed funds from the educational and research areas of the universities and nuclear research itself. Furthermore, the academic communities where the research reactors reside need an open atmosphere and access to facilities. Any security measures necessarily takes away from this and the amount that is required without the LEU change is much too high a cost for the universities. Thus inadvertently the use of HEU threatens the open atmosphere that is needed for the exchange of new ideas that makes for our democratic society.

Therefore, the new rule achieves several important goals. It reduces the danger and risk posed by these reactors to the surrounding communities. It allows these community/colleges to remain the open and free citadels of learning while allowing nuclear research, with a minimum of restrictions, to continue. Everyone wins. I think you should be commended for proposing the rule and hope you will approve it.

Sincerely,

Allen Blumenthal
Allen Blumenthal

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PDR PR
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NATIONAL LAWYERS GUILD

Los Angeles Chapter

25

DOCKET NUMBER
PROPOSED RULE

PR-50
(49 FR 27769)

(15)

DOCKETED
USNRC

'84 AGO 24 A10:40

RECEIVED
DOCKETING & SERVICE
BRANCH

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
attn: Docketing and Service Branch

RE: H.E.U. Conversion Rule (49 Federal Register 27769)

Dear Sir or Madame:

The Los Angeles Chapter of the National Lawyers Guild has voted to support the conversion of all nuclear reactors currently using highly enriched uranium.

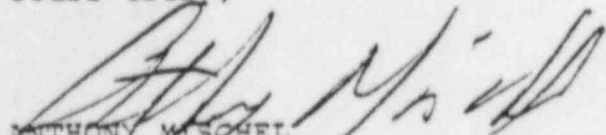
The use of highly enriched fuel is an unnecessary danger to public security because the reactors are largely unprotected. Further, the continued existence of bomb grade fuel hampers this country's and the world's ability to survive in the nuclear age.

The National Lawyers Guild supports any move, including the proposed rule, that lessens the threat of weapons grade fuel being used against human beings. The proposed rule is one step in that direction. Conversion of these reactors and removal of the weapons grade fuel can be a signal to the rest of the world that the United States takes seriously the problem of nuclear weapons proliferation. This proposal could help discourage the use of H.E.U. fuel world wide.

The need for conversion cannot be taken lightly. To effectuate the purpose of the proposed rule, it should be mandatory and implemented immediately. No exemptions should be allowed.

Thank you for your consideration of these comments.

Yours truly,


ANTHONY MISCHIEL
Executive Committee
Treasurer

ASM:sbc

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Added by card 8/24/84 pd



Founded 1937

TICKET NUMBER
PROPOSED RULE PR-50 (21)
(49 FR 27769)

RECEIVED

c/o NOVA
7800 Airpark Road
Gaithersburg, Maryland 20879
August 24, 1984

'84 SEP 10 P1:25
Secretary to the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
attention: Docketing & Service Branch
'84 AGO 28 A10:13

RE: Proposed Rule to Convert Research Reactors Using
Highly Enriched Uranium to Non-Weapons-Grade Fuels
(49 Federal Register 27769)

Dear Sir:

I write in support of a strong regulation to require
expeditious, mandatory conversion of research reactors now
using highly enriched uranium. Please consider the enclosed
testimony given before the Commissioners as my detailed comments
in regards the proposed rule.

Sincerely,

Theodore B. Taylor (D)

Dr. Theodore B. Taylor

enclosure: "Statement of Dr. Theodore B. Taylor
Regarding the Need to Convert Domestic Research
Reactors From Highly Enriched to Low-Enriched
Uranium Fuels"

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PDR PR
50 49FR27769 PDR

DS/11
and William R. Lohs
11/1/84

Acknowledges by card

8/29/84
PL

COCKEYED
USNRC

'84 AGO 28 AIO:13

STATEMENT OF DR. THEODORE B. TAYLOR

Before the Nuclear Regulatory Commission
Regarding the Need to Convert Domestic Research Reactors
From Highly Enriched to Low-Enriched Uranium Fuels
January 27, 1984

From 1949 to 1956 I worked on the design of nuclear explosives at the Los Alamos Scientific Laboratory. From 1956 to 1964 I worked at the General Atomic Division of General Dynamics Corporation, during which period I helped design the TRIGA research reactor. From 1964 to 1966 I was Deputy Director (Scientific) of the Defense Atomic Support Agency in Washington. The following years have been spent as an independent consultant to the U.S. Atomic Energy Commission and a number of other organizations, working on nuclear safeguards issues and other energy-related matters. I served on the Presidential Commission on the Accident at Three Mile Island. I am co-author of Nuclear Theft: Risks and Safeguards, as well as a number of other books and articles dealing with nuclear safeguards and related subjects. This morning I appear as a member of the Board of Directors of Nuclear Control Institute. A more detailed statement of my professional qualifications is attached.

It is my opinion that all domestic research reactors under the licensing authority of the Nuclear Regulatory Commission should be required to convert from highly enriched uranium (HEU) to low-enriched uranium (LEU) fuels as soon as the LEU fuels are available. I know of no reason that could justify the unique safeguards risks associated with continued operation of these reactors with materials so internationally dangerous. I come to this conclusion as a former designer of both nuclear weapons and research reactors, and from extensive involvement in the field of nuclear safeguards. The basis for this conclusion is as follows:

Weapons Implications

Uranium enriched to 93% in the isotope ^{235}U is weapons-grade. It is weapons-grade because it is directly usable in nuclear weapons without any further isotopic enrichment. Because it is weapons-grade material, 93% enriched uranium is a potentially attractive target for theft or diversion by terrorist groups or nations intent on acquiring nuclear weapons. The potential consequences of such theft or diversion are very grave.

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A group or nation capable of making nuclear weapons from 93% enriched uranium would not have any significant difficulty in separating the uranium from the uranium-aluminum eutectic in which it is found in flat-plate MTR-type research reactor fuel. The methods for doing that are widely published and fairly straightforward.²

Such a national or subnational group also would not have substantial difficulty in removing the uranium from MTR-type research reactor fuel that had been irradiated sporadically in a low-power reactor (e.g., a few hours per week at a maximum power of 100 kw_{th}.) It is more difficult than separating the uranium from unirradiated fuel plates, but it is something that could be done with techniques that are widely published. If the safety rules are compatible with a high degree of military urgency to obtain the uranium for weapons purposes, then the fact that the fuel contained some fission products would not get in the way very much.

Furthermore, the fact that some of the HEU at research reactors might be in the form of irradiated fuel, either in the core or in storage holes, while other material was in the form of fresh fuel in separate storage, would be little if any deterrent to theft of all the material. Dose rates far in excess of what most NRC-licensed research reactors appear capable of routinely producing in their fuel bundles would be necessary, in my opinion, for the fuel to be "self-protecting." To cite one specific example, if the calculations in Dr. Roger Kohn's September 4, 1982, declaration in the UCLA licensing case are correct, fuel bundles in the UCLA reactor drop below 100 rem/hour (at three feet from any accessible surface without intervening shielding) after just 8 hours of shutdown, below 34 rem/hour after one day, and apparently down to a few rem per hour after a shutdown or storage period of a few weeks. If correct, and assuming that the reactor operates only a few hours per week, neither irradiated fuel in storage nor in the core would be self-protecting and would be little deterrent to dedicated individuals or groups intent on acquiring nuclear weapons material.

To assert that the 4000 to 5000 grams of uranium-235 at 93% enrichment in the form of uranium-aluminum flat plate fuel, which are authorized at this and seven other university research reactors, would be of no interest to someone intent on manufacturing a nuclear weapon would be simply incorrect. It is, in my opinion, a credible threat that people might break into such research reactor facilities in order to acquire HEU. Particularly if one supposes a blackmarket and people selling stolen HEU at, say, a hundred thousand dollars per kilo. At present, only three NRC-licensed university reactors are authorized to store less than four to five kilograms of uranium-235 in highly enriched fuels, while 12 are authorized to store larger amounts ranging up to 45 kilograms U-235.

It is my opinion that anything more than a kilogram would be clearly excessive. From a proliferation standpoint there should be a significant burden upon a university to demonstrate that it could not perform the functions for which the reactor was intended without the requested highly enriched uranium. I would say that even more broadly: highly enriched uranium should not be used in quantities of more than a few hundred grams under any circumstances unless there is an absolutely compelling reason to do so. I know of no such reason that would be relevant to these reactors.

It is my opinion that the enrichment of these fuels is excessive. For general research use, the only advantage in going from 20% enriched uranium to 93% enriched uranium is that the neutron flux may increase somewhat at the same power level. I don't know what that increase in flux is for each specific reactor, but it is very hard to imagine that it would change significantly the nature of the experimental programs if the enrichment were reduced. Everybody wants to have all the neutrons they can get, but the universities already have limited themselves, by limiting the power of their reactors, and if they wanted more neutron flux they might increase the power level --- from 100 to 120 kilowatts, for example. One is talking about not anywhere near doubling the flux by increasing the enrichment.

Small kilogram quantities of uranium-235 in 93% enriched form would have, by far, greater potential consequences if stolen than an equal or even somewhat larger amount of uranium-235 in 20% enriched fuel. The critical mass of fully enriched uranium in metallic form with an ordinary reflector is roughly 20 kilograms. It depends on what the reflector is. With a more efficient reflector, the critical mass is considerably less. For example, critical mass with a thick reflector made of beryllium is approximately 11 kg. of uranium-235.

These figures are for the critical mass of uranium-235 at normal density. When compressed, the critical mass is considerably less. As I wrote in Nuclear Theft: Risks and Safeguards (Ballinger, Cambridge, Mass., 1974, at p. 20): "If, on the other hand the material is to be used in an implosion type of fission bomb, the amount required may be significantly lower than these quantities. Materials that are compressed above their normal densities have a lower critical mass than when they are uncompressed. In the special case when both the core and the reflector are compressed by the same factor, the critical mass is reduced by the square of that factor. Thus, when a spherical core and reflector assembly that is initially close to one critical mass is compressed to twice its initial density, it will correspond to about four critical masses." The maximum compression achievable in an implosion type fission weapon, and thus the minimum amount of uranium necessary to make such a weapon, depends upon the knowledge, skill, equipment and facilities of the bomb maker.

For 20% enriched uranium in metallic form with an ordinary reflector, the normal density critical mass of contained uranium-

235 rises to over 50 kg. It is possible to make a nuclear explosive with 20% enriched uranium but it would be very heavy, very inefficient and difficult to handle because of the relatively large amount of non-fissionable uranium 238 contained in this fuel. You would need approximately three times as much uranium-235 in the 20% enriched form as you would in the 93% enriched form in order to make a critical mass, but more important is the fact that you would be dealing with (three times five or) fifteen times as much uranium, which is much harder to move, much harder to compress.

Threats

The potential consequences of the theft of a single kilogram of 93% enriched uranium would be considerable if someone simply needed one kilogram to supplement an amount already obtained or if they needed or wanted some highly enriched uranium to make a threatened authority take a blackmail threat more seriously. To send a few grams would be so relatively easy to do that it might not have much effect on the credibility of the threat. To send a kilogram begins to be quite significant and they can simply say, "We haven't sent you more because, as you know, that is a significant fraction of the total amount we would need. We just want you to know we have kilogram quantities of this material and here is a kilogram."

Therefore, in my view, a request by an institution for kilogram quantities of highly enriched uranium is excessive unless there is some overriding reason that I cannot imagine --- such as national defense research, and even then I know of no such research which would require HEU fuel for such a reactor.

There is no crucial research at university reactors of which I am aware that would require weapons-grade uranium. I would say, in fact, that for uses of any kind, any quantity of HEU would be excessive. I say that because even in gram quantities there should be a special reason to have it because gram quantities could still be extremely helpful to people making a threat that might not necessarily be a hoax. It just reduces the amount of material they need in order to make a bomb, and also establishes credibility for a threat.

I have been informed that the original Argonaut reactor operated on 20% enriched fuel and that a number of other Argonauts have likewise operated on 20% enriched fuel. Assuming that is correct, I know of no reason --- and find it hard to imagine one --- why all Argonaut reactors should not likewise operate on 20% enriched uranium. I have also been informed that the University of Florida's Argonaut reactor was to be involved in testing some 4.8% enriched uranium oxide fuel. Assuming that that also is correct, that kind of fuel would likewise seem to me as something worth pursuing for other Argonaut reactors because it is even further away from weapons material.

I also have been informed that General Atomic currently has available low-enriched TRIGA fuel not only for conversion of TRIGA reactors, but for conversion of Argonaut and other research reactors presently utilizing highly enriched MTR-type plate fuel. If necessary, I would view conversion of these non-TRIGA reactors to low-enriched TRIGA fuel as a favorable alternative to permitting their continued operation with highly enriched uranium. It is much more difficult to make weapons of any kind out of lower enrichment uranium; the compromises in neutron flux, which I think are the main concern, are not large, if present at all.

Safety

Besides significant safeguards advantages in making a conversion to low-enriched TRIGA fuel, there also would be significant safety benefits. There certainly was a major safety benefit in the TRIGA fuel when we designed it and the TRIGA reactor.³ The main feature was a very strong prompt negative temperature coefficient, much higher than other research reactors, which meant that even if it went prompt critical the rise in temperature would extremely rapidly stop the chain reaction. That still stands. There is, of course, a level of excess reactivity above which the safety feature of not being able to damage any of the fuel with an accidental excursion is no longer true. You can always make it over-critical by design, to make it not have that self-limiting feature, but I don't see any excuse for doing it with any medium power research reactor, up to a megawatt at least.

The level of excess reactivity at which the prompt negative temperature coefficient ceases to be an effective self-limiting feature would be much higher for a TRIGA reactor or a reactor with TRIGA fuel than for the Argonaut and other research reactors operating with MTR-type fuel. At comparable levels of excess reactivity, the TRIGA fuel would definitely have significant safety advantages.

The difference in the TRIGA fuel is due to the fact that when the ratio of captures (in the water and other materials) to fissions (in the fuel) goes up, the reactivity goes down. That effect is produced by a change in temperature in the fuel itself, relative to the cooling water, and thus requires no heat conduction. It happens instantaneously because the heat is liberated by the fission reaction right in the fuel. In MTR-type research reactors the heat has to be transferred to the water, which takes a while, to make it expand. It is the expansion of that water plus some other effects that have to do with the water having to heat up that makes the reactivity go down. Because of this time-delay involved with the transfer of heat from the fuel meat to the water in MTR-type reactors, the shutdown mechanism is slower, permitting greater energy release before shutdown for an excursion of the same exponential period and a greater opportunity for fuel melting to occur before the excursion terminates than is true with the TRIGA.

That shutdown mechanism in the MTR-type reactors, requiring transfer of the heat to the water to cancel the reactivity, can produce effects in the water like boiling or a sudden expansion of the coolant which can, in effect, do some damage, even if fuel melting does not occur. The likelihood of there being changes in the fuel arrangement or in the grid supports or whatever is less for the TRIGA than for the Argonaut, according to the comparative designs when I knew about them. I was familiar with the Argonaut design at the time we designed the TRIGA.

In addition to the TRIGA fuel having a negative temperature coefficient that is far more prompt (i.e., it comes into play much faster), the size of the negative coefficient is also far larger, so the excursion is terminated much sooner, providing substantial additional protection against fuel melting.

The conversion to lower enriched uranium fuel, be it TRIGA fuel or flat plate fuel, would likely increase the negative temperature coefficient because of another factor, the Doppler effect. I cannot be absolutely sure there are not some compensating factors, but the Doppler broadening coefficient contribution to the temperature coefficient will go up and I do not know of any reason why other things would happen to make it go down.

A reduction in enrichment of the fuel can thus decrease the possibility or consequences of a destructive power excursion or criticality accident. Low enriched fuel has a contribution to limiting an excursion, an abating effect, that is the cancelling out of the reactivity because of the increased capturing by uranium-238. I cannot make the blanket statement that for any reactor design that it would be safer; it would be dependent upon a given change in the reactivity.

Security

Regarding what kind of security would be sufficient to satisfactorily minimize the risk of theft or diversion of kilogram quantities of HEU, consistent with the potential consequences of its theft, I would say that it should not be possible for a group quite knowledgeable about security and how to defeat it to describe to a jury of experts a credible scenario for stealing the material. In other words, I am thinking in terms of a jury situation, and I would say that security would be adequate if, and only if, such a jury of experts could not be presented with a theft plan that they thought had a reasonable chance of working.

I also would stress that an almost exclusive reliance on intrusion alarms tied into a campus police station absolutely would not be adequate, in my view, because that does not say anything about the ability of the campus police to effectively intercept people carrying out the theft. However, if there were an intrusion alarm between the point of entry and the material, and physical barriers in between sufficient to prevent penetration until the campus police and an additional response force had

arrived on the scene, then I would say that would be effective. But by definition I am saying that something considerably more than an intrusion alarm is required --- that is, barriers, very heavy containers or the equivalent, something that would create a physical delay of some significance, to ensure getting protective people there. And when I say protective people, I do not mean simply one or two watchmen checking in, but a force capable of successfully preventing the theft.

Any contention that detection of the theft or post-theft reporting would be sufficient is, in my opinion, highly irresponsible and not at all consistent with the potentially very significant consequences of theft of kilogram quantities of HEU. Merely being able to detect and report theft, while failing to adequately protect against theft, would be unconscionable.

I would view a theft of a kilogram or more of uranium-235 at 93% enrichment as having extremely significant potential consequences, simply by virtue of it being stolen. By this I mean it is then no longer a hypothetical question. When it has actually happened, it means that some people have gone to the trouble to steal that material. Having done so, it could be entering the black market, it could be joined with other materials which are on the blackmarket, it could go in the direction of being the start of the construction of weapons. I would say that if I heard a kilogram or more of highly enriched uranium had been stolen, I'd be extremely concerned. That would have international implications of great importance.

Conclusion

In conclusion, I would say continued use of highly enriched uranium in quantities of more than a few grams at domestic research reactors is highly undesirable and dangerous. The burden of proof should be on the reactor operators to make clear why it is truly necessary to use HEU as opposed to using 20% or less enriched uranium. I have not seen that case made. The essential consideration for the Nuclear Regulatory Commission is that highly enriched uranium is not essential to the operation of these reactors but is an essential ingredient for making nuclear weapons. The hazards of nuclear weapons being produced do not disappear even if the quantities of HEU at individual sites are not sufficient to make one nuclear weapon because these sources could be pooled.

It is very important for the Commissioners, in order to make rational decisions about the consequences of theft of uranium-235, to know what are the minimum quantities of uranium-235 necessary to make a nuclear weapon. I can say flatly that I would be very concerned about theft, clear evidence of theft, of a kilogram or more of highly enriched uranium, and I think everyone should be. If you ask how much less than a kilogram, I really could not go into that, and I want to make sure I am not being taken to say that one kilogram of highly enriched uranium is the minimum

quantity necessary to make a bomb. That minimum quantity is not a well defined number at all. It depends on the talents, experience and requirements of the designers.

From the point of view of one who has designed nuclear weapons, a kilogram or more of 93% enriched uranium is certainly a significant quantity. There is no question about that. It should not be around in situations where theft could occur unless there is some vast overriding reason such as national defense, and I know of no such reason which could be remotely applicable to the reactors licensed by the NRC.

It is my opinion that HEU should be prohibited internationally. We have the mechanisms set up in the United States to work toward that objective. HEU should be prohibited except under conditions that I would say are extraordinary. The prohibition should come first and the exception should come later. No research facility should have a quantity of HEU sufficient for building a weapon under any circumstances for any purpose.

I note that the NRC, on August 24, 1982, issued a statement of policy committing itself to exercising its licensing authority to reduce, "to the maximum extent possible," the use of HEU in domestic and foreign research reactors (47 FR 37007). It appears to me very important that the NRC carry out that policy with regard to all research reactors and HEU under its direct control in order to set a domestic example that foreign regulators and operators of research reactors can follow. Such leadership by the Commission can also influence the policy and actions of the U.S. Department of Energy with regard to the far greater number of research reactors and far larger quantities of civilian HEU under its control.

Therefore, given what I know about what HEU can be used for in terms of construction of a nuclear weapon or making of a nuclear threat, and also based on what I know about the needs of research reactors, the Commission should promptly issue a rule requiring the use of fuel of a lower enrichment. I would say further that every institution now using research reactors should look very carefully at the risks versus the benefits obtained (and the risks are significant) and treat them as potentially very dangerous pieces of equipment. The danger is especially worrisome when there are kilogram or more quantities of nuclear materials from which nuclear weapons can be made. The whole institution, not merely the nuclear engineering department, should make that assessment. My advice for them would be to avoid having reactors unless you absolutely have to. If you must have a reactor, always use the lower enrichment and keep the lowest quantity of uranium on hand. I doubt that there is any crucial research at a university requiring weapons-grade uranium.

FOOTNOTES

1. See also my declaration dated December 16, 1982, before the Atomic Safety and Licensing Board considering the license-renewal application of the UCLA Argonaut research reactor (Docket No. 50-142).
2. One such simple method is described on page 97 of John McPhee's The Curve of Binding Energy, Random House, NY, 1973, 1974.
3. A good description of the origins, intent, and basic operating principles of the TRIGA and its fuel can be found in Freeman Dyson's Disturbing the Universe (Harper & Row, NY, 1979), pgs. 94-102.

†

Professional Qualifications

DR. THEODORE B. TAYLOR

My name is Theodore B. Taylor. I am Chairman of the Board of Nova, Inc., a technical consulting firm specializing in energy applications.

I received my B.S. degree in physics in 1945 from the California Institute of Technology and my Ph.D. degree in theoretical physics from Cornell University in 1954.

From 1946 to 1949 I worked as a theoretical physicist at the University of California Radiation Laboratory in Berkeley.

From 1949 to 1956 I was on the staff of the Los Alamos Scientific Laboratory, working on the design of nuclear explosives. One of my primary assignments at Los Alamos was to design fission bombs of very small physical dimensions and mass.

In 1956 I joined the General Atomic Division of General Dynamics Corporation where, along with Edward Teller, Freeman Dyson, and others, I helped design the TRIGA research reactor. While at General Atomic I was also technical director of the Nuclear Space Propulsion Project (Project Orion).

From 1964 to 1966 I was deputy director (scientific) of the Defense Atomic Support Agency, U.S. Department of Defense.

I spent the following two years in Vienna, Austria, as an independent consultant to the U.S. Atomic Energy Commission and several other organizations, working on the subject of international safeguards for nuclear materials.

In 1967 I founded the International Research and Technology Corporation, a company primarily concerned with studies of the impact of technology on society, which I served as Chairman of the Board until 1976.

From 1976 to 1980 I was Visiting Lecturer with rank of Professor in the Mechanical and Aerospace Engineering Department at Princeton University.

In the aftermath of the accident at the Three Mile Island nuclear power plant, I served as a Commissioner on the President's Commission on the Accident at Three Mile Island (the "Kemeny Commission.")

I am a member of the American Association for the Advancement of Science and the American Physical Society, a member

of the Board of Directors of Nuclear Control Institute, and have served as a consultant to the Air Force Science Advisory Board, 1955-58, Los Alamos Scientific Laboratory, 1956-64, Aerospace Corporation, 1960-61, Atomic Energy Commission, 1966-70, Defense Atomic Support Agency, 1966-69, Rockefeller Foundation 1977-79, and was chairman of the Los Alamos Study Group, Air Force Space Study Commission, 1961.

In 1965 I was one of the recipients of the Ernest C. Lawrence Memorial Award of the AEC for work on the development of nuclear explosives and the TRIGA research reactor.

I am co-author of The Restoration of The Earth (1973), Nuclear Theft: Risks and Safeguards (1974), Energy: The Next Twenty Years (1979), and author of numerous articles on nuclear safeguards and proliferation in technical journals and popular media. A more detailed account of my activities in the safeguards field can be found in John McPhee's book, The Curve of Binding Energy (1973, 1974).

I maintain an active "Q" clearance.

*

1500 N. B. Deiforte Ave.
Santa Cruz, CA. 95065
August 28, 1984

DOCKET NUMBER PR-50
PROPOSED R. (49 FR 27769)

(26)

RECEIVED
Docketing and Service Branch
Secretary of the Commission
U.S. N.R.C. PUBLIC
Washington, D.C. 20555

'84 AGO 30 P4:21

BRANCH

Dear people :

I am deeply concerned about the presence of highly enriched (weapons grade) uranium fuel in the thirty research reactors in the United States. This fuel must be tempting booty for terrorist organizations and nuclear-aspiring nations and represents a dangerous and unnecessary threat of nuclear proliferation. It is also a dangerous presence in our population centers, where these research facilities are located.

I urge you to adopt the HEU Conversion Rule 49 (Federal Register 27769) to convert these reactors to low-grade uranium fuel.

Thank you.

8409060283 840830
PDR PR
50 49FR27769

PDR

Administered by card

9/4/84

pd

Mark A. Mathews

DS10/10
att. William R. Latis
113055

RICHARD G. SAXON, M.D., INC.

16260 VENTURA BOULEVARD
ENCINO, CALIFORNIA 91436
789-0581

FILE NUMBER
PROPOSED RULE PR-58
(49FR 27769)

(25)

ORTHOPEDIC SURGERY

August 28, 1984

'84 AGO 30 P12:33

Secretary of the Commission
Nuclear Regulatory Commission
Washington, DC 20555

Attn: Docketing and Service Branch

Dear Sir:

I am very much in favor of your new proposal to convert thirty research reactors to low enriched fuel. The most probable cause of any future nuclear war is undoubtedly that of an unstable leader in a minor country obtaining a nuclear weapon manufactured from stolen sources. Any effort to prevent nuclear weapons proliferation is mandatory. Any failure to do so will be irretrievable.

Although this change in the fuel will increase operating cost, it will be a small price to pay for our safety and peace of mind.

Sincerely,

Richard G. Saxon

Richard G. Saxon, M.D.
RGS/pw

DS10 1/D
add: William R. Latis
1130 SS

Administrative by 9/4/84
pd

UNIVERSITY OF CALIFORNIA, LOS ANGELES

UCLA

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO

SANTA BARBARA • SANTA CRUZ



RE: HEU Conversion Rule
(49 Federal Register 27769)

CENTER FOR INTERNATIONAL AND STRATEGIC AFFAIRS
LOS ANGELES, CALIFORNIA 90024

(213) 825-0804

'84 AGO 30 A11:42 August 23, 1984

Attn: Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington D.C. 20555

Dear Sirs:

It has come to my attention that the Nuclear Regulatory Commission has before it a proposed rule that would require about thirty nuclear research reactors to convert from HEU to LEU. I have recently written a book on the challenges posed by nuclear proliferation and subnational nuclear threats (Global Nuclear Energy Risks: The Search for Preventive Medicine, Westview Press, forthcoming November 1984). It is my professional judgement that the elimination of HEU from lightly guarded research reactors is a prudential step to prevent diversion. American action in this regard would encourage other nations where the danger of diversion may be more acute to do likewise. Accordingly, I urge you to adopt and apply the rule on a mandatory basis without delay.

Thank you for your consideration.

Sincerely,

Bennett Ramberg
Bennett Ramberg Ph.D.
Research Associate

DSIC 40
add William A. Lids
113055

9/4/84
pa

COMMITTEE TO BRIDGE THE GAP

1637 BUTLER AVENUE #203
LOS ANGELES, CALIFORNIA 90025
(213) 478-0829

DOCKET NUMBER

PROPOSED RULE

PR-50
(44 FR 27769)

(27)

27 August 1984

Secretary of the Commission
Nuclear Regulatory Commission
Washington, D.C. 20555

RE: PROPOSED RULE ON HIGHLY ENRICHED URANIUM

'84 AGO 31 A11:13

Dear Sir:

Following are comments on the NRC's proposed rule limiting use of highly enriched uranium in domestic research and test reactors (Federal Register, July 6, 1984).

The proposed definition of "unique purpose" is too broad. It would permit deferral of conversion based on a single experiment of trivial worth. Instead, facilities requesting exemption should demonstrate that their requirement for HEU is of national security importance equal to or greater in magnitude than the proliferation threat posed by HEU. Moreover, this vital use of HEU should occupy the major portion of reactor usage, and should not be provided by any other reactor in the U.S. which could be contracted for this particular purpose.

The proposed implementation schedule is much too long. Licensees should be required to submit schedules for conversion four months after the rule becomes effective. The rule itself should specify that conversion would be mandatory within twelve months of the time the appropriate LEU fuel becomes available.

Strictly speaking, we believe that the economics of conversion should not influence NRC actions in this instance. If prompt implementation of this rule is in the interest of international security, as we believe it is, economics should not interfere. To put it another way, the highest estimates of the costs of conversion are far less than the costs that would be incurred if HEU were actually stolen from one of these reactors. Incidentally, the costs of conversion will not be significantly greater than the costs of upgrading security, considering the hardware involved and the cost of even a single security guard for twenty years.

Availability of fuel: We note that TRIGA-type LEU is available now to convert those TRIGA reactors which use HEU. In addition, we understand that GA Technologies has the capability of converting reactors which use flat-plate HEU to TRIGA-type LEU. They have in fact already carried out numerous such conversions.

DSIC 10
add William R. Laks
1130 SS

6409060286 [600]

Acknowledged by card

9/14/84

pd

We note also the improvement in safety margins due to the prompt negative reactivity coefficient associated with this fuel. This fuel has of course already been licensed by the NRC and is available now.

Availability of shipping casks should not be a factor in determining conversion schedules, since each conversion requires a cask for only a matter of days. But if there is any reason to believe that a shortage of casks could significantly delay conversions, funding should be sought for an additional cask or two.

Reactor usage should not be a factor in determining conversion schedules. The international significance of conversion must outweigh such considerations.

We oppose the use of "generic envelopes of safety limits." Instead, safety margins should increase or remain equal to those currently approved by the NRC. As long as this is true, no license amendment should be required for conversion.

If, however, safety margins are decreased by conversion, then a license amendment must be required and the opportunity for public hearing provided.

It is argued that the materials affected by the proposed rule comprise only a fraction of the HEU in circulation. However, we believe that it is important to remove from circulation even "a fraction" of the HEU. It must be recalled how dangerous even a small quantity of this material can be. Furthermore, if we in the U.S. do not take this step, foreign reactor operators will never convert their facilities.

It has been alleged that a required conversion will lead to the shutdown of marginal reactor facilities. Even if this were true, it could not justify weakening the proposed rule which, because of its international security significance, must take precedence, especially over "marginal" facilities.

It has been suggested that the prospect of a required fuel conversion was a factor in the recent shutdown of the UCLA reactor. This is nearly the opposite of the truth. UCLA withdrew its license renewal application one week before hearings on security were to commence. If UCLA had converted to LEU, the security contentions of the Intervenor would have evaporated. UCLA could have sailed through the security hearings and might well have retained its operating license. Conversion would make research reactors easier to license.

It is noteworthy, also, that LEU fuel for UCLA was available

for free from the University of Florida, which apparently possesses enough spare LEU to convert all the Argonaut-type reactors in the country.

The international significance of converting domestic reactors from HEU fuel should be clearly understood. When this is done, the various obstacles and objections fade away into relative unimportance. The proposed rule should be promptly and completely implemented.

Sincerely,

A handwritten signature in cursive script that reads "Steven Aftergood". The signature is written in dark ink and is positioned above the printed name and title.

Steven Aftergood
Executive Director
Committee to Bridge the Gap

COMMITTEE TO BRIDGE THE GAP

1637 BUTLER AVENUE #203
LOS ANGELES, CALIFORNIA 90025
(213) 478-0829

October 31, 1984

Supplementary Comments on the HEU Conversion Proposal

The Committee to Bridge the Gap favors the NRC proposed rule requiring conversion of domestic research reactors, as previously indicated. Following are supplementary comments on specific issues or aspects of the proposal.

Virtually Any HEU-Fueled Reactor Potentially Contains Enough HEU for a Weapon

It has been suggested that the quantity of HEU needed for a single explosive is more than the inventory of any one low power reactor, and that therefore these can be exempted from the rule. This is in error for at least a couple of reasons.

The Commission has already heard testimony that the fast critical mass of an implosion-type weapon can be quite low, even lower than the NRC's somewhat arbitrarily designated "formula quantity". Most of the details of construction of such a weapon are all too readily accessible. Therefore, any single reactor facility with kilogram quantities of HEU on site must be considered a potential target for theft or diversion, and cannot be exempted from the proposed rule.

More broadly, the potential for extortion or other threats of even a tiny quantity of HEU is enormous, aside from its potential for actual utilization in a weapon. A first successful theft of HEU (or even a convincing attempt) would be a disaster on many levels and,

incidentally, would mean the prompt demise of many research reactor programs.

One commenter has asserted that there is not enough HEU reactor fuel in existence to make a single fast fission device. This astonishingly naive proposition is based on the absurd assumption that what is under consideration is a weapon constructed from unprocessed fuel plates! The commenter goes on to state that removal of HEU from the fuel plates is "not impossible," but decidedly "difficult." This is a dangerous misunderstanding. Extraction of HEU from fuel plates, even lightly irradiated ones is, relatively speaking, quite simple.

(Note that this is particularly true of the low power reactors, which have a low burnup rate, and are not highly radioactive. From this and other points of view, these reactors appear to be among the most attractive potential targets. It is appropriate that they should be among the first to convert.)

ALTERNATIVES: Conversion Fuel is Available Now

One alternative to conversion of plate type reactors to the new high density LEU fuels is conversion to TRIGA-type LEU fuel. Though many such conversions have already taken place, this alternative appears to have received little consideration.

GA Technologies of San Diego currently has commercially available 19.7% enriched TRIGA-type fuel. The GA publication "TRIGA" (Attachment A) at page 11 shows a photograph of the replacement TRIGA bundle alongside a standard flat-plate bundle. As indicated in the section

on "Research Reactor Conversions":

A number of reactors originally built for plate type fuel elements have been converted to use TRIGA fuel. In most instances, the converted reactors have retained their existing core grid structure, control rod drives, and control console.

Attachments B (page 5) and C list numerous research reactors originally utilizing plate type fuel which have been successfully converted to TRIGA fuel. These include Penn State, Washington State, the University of Wisconsin, Texas A & M, the University of Maryland, and a number of others.

A Dr. Muno of the University of Maryland reactor staff confirmed to us that conversion of the Maryland reactor took place in 1974. LEU was chosen because it was anticipated that the NRC would eventually require a high degree of security for HEU, and that it would be unlikely that the reactor staff could convince the University to provide armed guards, and the like. TRIGA fuel was chosen for its inherent safety features, primarily the prompt negative temperature coefficient which provides a far greater degree of protection against destructive power excursions than found with flat-plate fuel.

Dr. Muno indicated that a slight drop in flux upon conversion to TRIGA LEU fuel could be compensated for by a more efficient geometry, and that in any case, the current flux was more than adequate for the University's needs (mainly activation analysis). One researcher in materials science occasionally required a high flux of around 10^{14} nvt, so he would send his samples off to Argonne or Oak Ridge.

We confirmed with the TRIGA division of GA Technologies the current commercial availability of TRIGA LEU fuel for plate-type

reactors and that conversion to TRIGA LEU fuel involves no significant drop in neutron flux. We were informed that the average flux is comparable, though the shape will vary. Water-filled flux traps can increase the available flux; even without such flux traps, though, the reactor would still be able to perform the same functions as prior to conversion. Furthermore, conversion rarely requires changes to the control rod or cooling system.

GA, we were assured, currently has commercially available LEU TRIGA fuel for conversion of plate-type reactors and is "ready, willing, and able" to perform conversions as they come up. The safety features of TRIGA LEU and its current availability, as well as GA's experience in carrying out conversions, may make it an attractive alternative for some facilities which now use flat-plate type HEU.

We conclude that the Federal Register Notice (49 FR at 27771) is at least partially in error in stating that

successful implementation of the proposed rule ... depends on (1) the continued success of the DOE funded RERTR program (2) the development of acceptable, and available, replacement fuel, and...

Acceptable replacement fuel is now available, independently of the RERTR program, in the form of TRIGA LEU fuel.

Will Conversion Lead to Shutdown of Reactor Facilities?

This concern is backwards. We have argued in detail elsewhere that it is non-conversion which will lead to greater pressure on licensees and hence a greater possibility of shutdown. (see enclosed

Statement to Lloyd-Fuqua Subcommittees, pp. 6-9).

The alternative to conversion is not really an alternative at all for most facilities, especially academic institutions, namely a drastic increase in security. The current and even the new proposed NRC security upgrade requirements, when compared to those in place at government and military installations using HEU, appear largely cosmetic. Ultimately, we believe, and perhaps very soon, required security precautions for HEU use will include 24 hour armed guard presence, perimeter defenses, metal detectors, and other high-security measures. If world conditions continue to deteriorate, and the threat of terrorism spreads, campus facilities will be more, not less vulnerable. Security requirements will be upgraded, at licensee expense, not reduced.

The only public concerns expressed to date about reactor fuel have been about the use of weapons-grade fuel, not about LEU. Given the international security implications of HEU use and the easy availability of an alternative, these pressures will only intensify. It is best to deal with them now, in an orderly fashion. The NRC proposal is a responsible attempt to do just this.

Generic Licensing

Though we have previously expressed opposition to generic licensing, we would not oppose it, in order to expedite implementation of conversion, if the following conditions were observed:

There should be opportunity for public comment and review of the proposed envelopes of safety limits.

The generic licensing procedure must not be used to allow changes in reactor operation unrelated to conversion such as increases in power level or excess reactivity, for example, or pulsing mode operation. Any such unrelated changes would have to be pursued through the normal amendment procedure.

The Case of UCLA

The UCLA reactor relicensing proceeding, which concluded with shutdown of the reactor, has been cited time and again as "a casualty of litigation" or something similar. This claim is not based on facts.

In the first place, the Chancellor of the University, in withdrawing the application for relicensing, claimed the decision was based on academic factors, including the decline in student enrollment and curtailed research applications, and this is certainly part of the explanation. Indeed, in one recent year, the Atomic Safety and Licensing Board found that the reactor had been used a mere 31 hours for educational purposes, and hundreds of hours for commercial functions, in violation of its license.

But a review of the record of the UCLA proceeding reveals profound safety problems at the facility which the University was unwilling to address. To give just a handful of examples, which serve to portray not only an extraordinarily dangerous facility, but also a grievous lack of regulation on the part of the NRC:

--The reactor, designed for \$1 of excess reactivity, was licensed for \$3.50(!), about the same amount which produced a destructive power excursion in SPERT and BORAX cores.

--UCLA's own Hazards Analysis predicted radiological health consequences to the public in the event of a major accident far in excess of regulatory limits. The reactor had no containment and no low-population buffer zone.

--The exhaust stack, which released radioactive Argon-41 gas whenever the reactor operated was lower than adjacent buildings, and directly upwind of an air conditioning inlet, so that the stack was feeding the air supply of neighboring classrooms.

--Due to miscalibration of monitors, Argon-41 release to the environment was underestimated by a factor of 300.

--Security: Hinges on doors to supposedly secure areas were located on the outside of the door, where they could be easily removed; the alarm system was on occasion found to have been "tuned down" so far that it could not be even intentionally activated; HEU was stored in an ordinary filing cabinet; key control was extremely poor; police response was uncertain; etc.

NRC regulations provide for a summary disposition procedure, by which allegations which have no factual basis can be dismissed without hearing. For obvious reasons, all of the safety and security problems at UCLA were found to require hearing.

It is no wonder that not a single member of UCLA's distinguished nuclear engineering faculty would testify in defense of the reactor. On the other hand, over a dozen experts of national repute, in disciplines ranging from reactor physics to metallurgy of reactor fuel, and including health physics and physical security, volunteered their time to bring to the Licensing Board's attention major flaws

in the design and operation of the reactor.

The Licensing Board judges regularly chided the University for its superficial (their word), evasive, inadequate defense. In point of fact, the reactor, in its then-current configuration, was not defensible.

Why did the proceeding last so long? A primary reason was UCLA's interest in delay. As long as no conclusion was reached, the reactor was permitted by law to continue to operate. Another reason was the repeated misrepresentations on the part of University and Staff representatives, which required many months to address. But as much as anything else, the explanation appears to be political. An NRC employee in a position to know told us that the Licensing Board was reluctant to issue the inevitable ruling that the reactor was unsafe. To avoid this unprecedented conclusion, the judges gave UCLA repeated opportunities for rebuttal and for supplementary testimony.

All to no avail. UCLA was not a victim of litigation, but of an unsafe reactor whose safety deficiencies it was unwilling to correct. It should be pointed out that as Intervenor, it was never our purpose to shut down the facility. From the beginning, we supplied UCLA with a list of specific safety concerns which could have been resolved with a fraction of the funds spent on litigation (e.g. reduction in excess reactivity, elevation of the exhaust stack, conversion to LEU). UCLA chose the hard way.

In the current context, the most important lesson for other licensees is in the controversy over UCLA's use of HEU. Had the reactor been fueled with LEU, the major security problems at the

site, and a substantial portion of the safety problems would have been resolved. With LEU, the UCLA reactor might still be operating.

It is worth noting in this connection that it would have been easier and cheaper to convert UCLA to LEU than almost any other reactor. This is because the University of Florida's Argonaut reactor appears to have on site enough 4.8% enriched SPERT LEU fuel to convert all five Argonauts in the country, including UCLA's. (see Attachment D). This fuel would be available essentially for free. Furthermore, the University of Florida has already performed extensive safety analyses of conversion of their reactor, most or all of which would have been directly applicable to UCLA's, further reducing the burden on the latter.

Will the Committee to Bridge the Gap Intervene to Block Conversion
License Amendments?

The Committee to Bridge the Gap will not, under any circumstances, intervene to block conversion to LEU. Nor will we assist any other group or individual to do so.

However, if the proposed rule were overturned or weakened, e.g. to exclude reactors with lifetime HEU cores, we would diligently assist in legal and other efforts to promote conversions at affected reactors. (See letter from S. Aftergood to E. Ricci, Attachment E).

Relative Value of Reduced Risk of Diversion or Theft of HEU

The low power research reactors which use HEU, including those with lifetime cores, present the greatest risk of theft or diversion

of any category of research reactor, or most other nuclear facilities, for that matter. This is true for several reasons.

Because they are operated at low power, and even so only irregularly, they are not highly radioactive at all. Compared to high power reactors, the radiation level of the low-power fuel is so low that it presents virtually no deterrent at all to a potential thief. Most of these reactors are incapable of sustaining even the minimal 100 rem/hr/bundle at 3 feet, which has been called a "self-protecting" level, though this is highly arguable.

Secondly, and for the same reason, this fuel is relatively easy to reprocess. At most, some stages of separation would need to be performed by remote control. This makes it especially attractive.

Most important of all, the security precautions at most university facilities are scandalously poor. Certainly, in a relative sense, these facilities are by far the most vulnerable of any reactors. They do not begin to match the sophisticated security apparatus found, for example, at DOE facilities. Security at fuel fabrication facilities and weapons facilities are, in turn, even greater.

In an absolute sense, security at campus reactors is minimal at best. First of all, if Staff counsel in the UCLA proceeding is to be believed, there is no NRC requirement to protect against theft, only to detect and report it.

NRC Staff is currently considering whether or not to impede unauthorized removal of HEU, and whether or not to arrange for a single, armed law enforcement agency respondent! The problem is not that such considerations are belated, they are totally unacceptable.

They do not begin to seriously address the risk of theft or diversion.

It is therefore most logical, and indeed vital, that conversion should begin with the facilities at greatest risk-- the campus reactors.

Conversion Schedule

In view of the national and international security interests involved, conversion should be carried out as soon as possible once suitable replacement fuel is available, which in almost all cases it appears to be already.

The 12 month period cited in the implementation provisions of the rule for development and submission of a proposed schedule appears excessive. We propose that this period be reduced to six months, with a target date for completion of conversions to be 24 months or less from the effective date of the rule.

Given this framework of a two year implementation period, the licensee should be permitted to take into account "reactor usage" factors, and to schedule conversion at a time which is most advantageous to the facility.

Availability of shipping casks would not appear to be a serious constraint, since a cask would be required only for a matter of days. If, nevertheless, there appears to be a shortage of casks, this will be evident well in advance (or may be already), and additional casks should be purchased or otherwise acquired as soon as possible.

The "Unique Purpose" Exemption

The unique purpose provisions appear to have been designed

to eliminate injury to national research interests by exempting from conversion those few facilities whose programs could not carry on without use of HEU.

We believe the criteria for an exemption should be narrowed as follows:

In itself, "a specific experiment" requiring HEU use is insufficient grounds for an exemption. Isolated experiments could conceivably be carried out at another facility, such as a national lab, contracted out for this specific purpose.

In all cases, there should be provisions for assessing the merit of the request for exemption. In other words, the licensee should have to demonstrate not only the need for HEU for certain research, but also the value of the proposed research. And this value should be such as to outweigh the national interest in reducing the use of HEU.

Such a determination necessarily includes some subjective elements, and it should not be left alone to the Director of Nuclear Reactor Regulation. Approval of any exemption from conversion should require approval of a majority of the Commissioners.

Further, while conversion may be expedited through generic licensing or minor license amendments, those facilities requesting an exemption from conversion should be closely scrutinized. Requests for exemption which are to be considered by the Commission should be published, and the opportunity for public review and comment allowed.

Any exemptions granted should not be open-ended, but should be periodically reviewed to determine if suitable replacement fuel has become available, and if the unique purpose is still being fulfilled.

The Pollack Memorandum

In 1983, Dr. Gerald L. Pollack of Michigan State University performed an exhaustive survey of the 23 academic institutions which use HEU to determine their positions on conversion and to assess any problems which might arise.

Pollack concluded that "the reactor administrators are generally in favor of the conversions to LEU and would be cooperative." Because of its comprehensive nature, and the contrast it provides with statements of some commenters, Pollack's Memorandum is submitted for review herewith as Attachment F.

Concluding Remarks

The Commission has for several years affirmed the policy goal of minimizing as far as possible the use of HEU, in domestic and foreign research reactors. The current proposed rule represents the first step towards achieving this goal. If the Commission is serious about non-proliferation, it is essential that its long-standing commitment begin to be finally actualized, and not reversed or watered-down at the first opportunity.

The NRC proposal is not a total solution to the problem of nuclear proliferation; it is not intended to be. But it is vital in and of itself, and it is an essential first step towards a more complete reduction in HEU use, at home and abroad.

The Pollack Memorandum

In 1983, Dr. Gerald L. Pollack of Michigan State University performed an exhaustive survey of the 23 academic institutions which use HEU to determine their positions on conversion and to assess any problems which might arise.

Pollack concluded that "the reactor administrators are generally in favor of the conversions to LEU and would be cooperative." Because of its comprehensive nature, and the contrast it provides with statements of some commenters, Pollack's Memorandum is submitted for review herewith as Attachment F.

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The NRC proposal is not a total solution to the problem of nuclear proliferation; it is not intended to be. But it is vital in and of itself, and it is an essential first step towards a more complete reduction in HEU use, at home and abroad.

DOCKET NUMBER
PROPOSED PR-50 (40)
(49 FR 27769)

M. A. Tsalis
151 Santa Dr.
Ben Lomond, CA 95005
August 29th, 1984

ATTN: Docketing & Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington D.C. 20545 SEP 18 P6:35

SEP-6

RE: HEU Conversion Rule (49 Federal Register 27769)

Dear Sir:

I am writing to support conversion of all nuclear reactors which use highly enriched uranium.

It concerns me greatly ^{that} this fuel, if stolen, could be made into nuclear bombs thereby adding to the grave problem of nuclear proliferation. The financial cost of converting to low enriched fuel is insignificant when compared to the grave risk & far greater cost should highly enriched fuel be stolen.

I urge a prompt non-voluntary conversion of all research reactors to the (LEU) low enriched fuel.

Thank you for your consideration.

Yours Truly,

Mary A. Tsalis

Mary A. Tsalis

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PDR PR
50 49FR27769 PDR

1/0
DB:ada William R. Lee 1055

9/10/84
#2

OLIVIA DIAZ, M.S.

CERTIFIED REHABILITATION COUNSELOR
TELEPHONE (213) 681-2282

550 EAST CALIFORNIA

PASADENA, CALIFORNIA 91106

September 14, 1984

SECRET NUMBER
PROPOSED RULE PR-50 (48)
(49 FR 27769)

'84 SEP 17 P4:47

Attn: Docketing & Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: HEU Conversion Rule (49 Federal Register 27769)

Dear Sir:

I am writing to express my support for the conversion of all nuclear reactors which use highly enriched uranium.

I have just learned that it is possible to convert HEU, which could be used to make atomic weapons, to LEU, which could not. If the technology to do that exists and is feasible for use, why isn't it being put into effect immediately?

Theft of HEU to be used clandestinely to make atomic weapons is such a real possibility that everything should be done to prevent its possibility. I understand the cost of conversion is insignificant compared to the potential costs involved if a successful theft of fuel were carried out.

America must take seriously the threat of nuclear proliferation. By making this conversion mandatory, we can send a clear message to the world that we are doing what we can to make the world a little safer from irresponsible use of nuclear weapons.

Please move to make these conversions mandatory and do it immediately.

Sincerely,

Olivia Diaz

Olivia Diaz, M.S.

OD:s

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DSIC
add William R. Labe
113055

Administrative
9/18/84
PA

110

Congress of the United States

House of Representatives

Washington, D.C. 20515

November 2, 1984

'84 NOV -8 P1:33

Mr. Samuel J. Chilk
Office of the Secretariat
Docketing and Service Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Chilk:

This is to express our strong support for the proposal to require the replacement of highly enriched uranium (HEU) fuel in research reactors licensed by the Commission with low enriched uranium (LEU) fuel. We urge the adoption of the proposed NRC rule that would implement that proposal. We firmly believe that the use of a nuclear explosive material, such as HEU, as a reactor fuel poses significant and unnecessary risks that must be avoided where possible.

The elimination of HEU from research reactors in the United States is clearly in the national interest as it will directly reduce the possibility of theft and misuse of this material and the likelihood of terrorist acts against facilities where it is being used.

Moreover, the conversions which would take place under the rule would set an important international example and establish U.S. leadership in the conversion of research reactors throughout the world to non-explosive fuels. The proposed rule is clearly in the non-proliferation and international security interests of the United States and of the world as well.

In view of these public benefits we believe Congress will continue to provide funds not only to complete the development of reduced enrichment fuels but to defray the cost of its use in university research reactors as well.

The Commission is to be commended for its initiative in this important area.

Sincerely,

Richard Ottinger

Richard L. Ottinger, Chairman
Subcommittee on Energy
Conservation and Power
Committee on Energy and Commerce

8411130520 841102
BFF BF

Ed Markey

Edward J. Markey, Chairman
Subcommittee on Oversight and
and Investigations
Committee on Interior and
Insular Affairs

ASSISTANT VICE PRESIDENT

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TASK FORCE

84th Congress of the United States

House of Representatives

Washington, D.C. 20515

November 2, 1984

PROPOSED FILE PR-50
(49 FR 27769)

(127)

Mr. Samuel J. Chilk
Office of the Secretariat
Docketing and Service Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Chilk:

I am writing to support the proposed NRC rule to require NRC-licensed research reactors to convert from highly enriched uranium (HEU) to low enriched, non-weapons usable uranium fuels.

The conversion of our domestic, NRC-licensed research reactors will help demonstrate that the U.S. is willing to set the standard in the conversion of reactors to safer fuels. A good U.S. example will become increasingly important in convincing other nations to convert their reactors to safer fuels.

In addition, implementation of the proposed rule would help reduce the future threat of terrorism within the U.S. by reducing the amount of HEU in circulation. While at present NRC-licensed research reactors do not appear to be likely targets of terrorist groups, it is clear from past acts by international groups, as Commissioner Bernthal noted recently in Congressional testimony, "that a threat can materialize without sufficient warning from intelligence sources."

I appreciate having the opportunity to express my views in support of the NRC-proposed rule.

Sincerely,

Michael D. Barnes
Michael D. Barnes

11/6...To EDO for Appropriate Action
Cpy's to: RF, OCA to Ack..84-1063

MDB/lo

DSIC
all letters to Chilk
11/10/84

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